



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

1595 Wynkoop Street  
DENVER, CO 80202-1129  
Phone 800-227-8917  
<http://www.epa.gov/region08>

Ref: 8EPR-SR

January 31, 2011

**MEMORANDUM**

**SUBJECT:** Review of draft Field Modification #3, Libby OU3 Phase IVA Sampling and Analysis Plan

**FROM:** Bonnie Lavelle  
Remedial Project Manager  
Libby Asbestos Site, OU3

A handwritten signature in black ink, appearing to read "Bonnie Lavelle", is written over the printed name and title.

**TO:** Site File

The attached documents summarize the basis for Field Modification #3 to the Libby OU3 Phase IVA Sampling and Analysis Plan and review comments received by EPA from Remedium and their contractor, MWH.



Sample Condition: COCs 7-9

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle, John Garr

07/28/2010 02:38 PM

Please respond to kyeong.corbin

Show Details

History: This message has been forwarded.

The following group of samples cannot be analyzed directly due to dusty/overloaded condition.

A group of P4-00083, P4-00084 and P4-00085

A group of P4-00086, P4-00087 and P4-00088

A group of P4-00092, P4-00093 and P4-00094

A group of P4-00099, P4-00100 and P4-00101

We will go ahead and process the rest of the samples. If you have any questions, please give me a call.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
**ATC Associates Inc. | Hygeia Laboratories, Inc.**

---

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**626-355-4711 phone | 626-355-4497 fax**  
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Sample Loading Status: COC#s 10-15

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/06/2010 01:03 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following group of samples cannot be analyzed directly due to dusty condition of the cassettes:

A group of P4-00120, P4-00121, P4-00121  
A group of P4-00123, P4-00124, P4-00125  
A group of P4-00126, P4-00127, P4-00128  
A group of P4-00129, P4-00130, P4-00131  
A group of P4-00132, P4-00133, P4-00134  
A group of P4-00144, P4-00145, P4-00146  
A group of P4-00151, P4-00152, P4-00153  
A group of P4-00154, P4-00155, P4-00156  
A group of P4-00163, P4-00164, P4-00165  
A group of P4-00187, P4-00188, P4-00189

If you have any questions, please give me a call.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor  
ATC Associates Inc. | Hygeia Laboratories, Inc.**

---

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Filter Loading Status: COC#20100803

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/09/2010 03:48 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following group of samples cannot be prepared directly due to dusty condition:

A group of P4-00205, P4-00206, P4-00207

A group of P4-00208, P4-00209, P4-00210

A group of P4-00211, P4-00212, P4-00213

A group of P4-00214, P4-00215, P4-00216

A group of P4-00220, P4-00221, P4-00222

A group of P4-00226, P4-00227, P4-00228

A group of P4-00229, P4-00230, P4-00231

A group of P4-00232, P4-00233, P4-00234

A group of P4-00247, P4-00248, P4-00249

A group of P4-00250, P4-00251, P4-00252

A group of P4-00253, P4-00254, P4-00255

A group of P4-00256, P4-00257, P4-00258

A group of P4-00265, P4-00266, P4-00267

A group of P4-00268, P4-00269, P4-00270

If you have any questions, please give me a call. Thank you.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
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Filter Loading Status: COC#20100804

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/09/2010 04:07 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following samples cannot be prepared directly due to dusty condition of the cassettes:

A group of P4-00289, P4-00290, P4-00291

A group of P4-00292, P4-00293, P4-00294

A group of P4-00295, P4-00296, P4-00297

A group pf P4-00298, P4-00299, P4-00300

A group pf P4-00310, P4-00311, P4-00312

A group of P4-00313, P4-00314, P4-00315

A group of P4-00319, P4-00320, P4-00321

A group of P4-00322, P4-00323, P4-00324

If you have any questions, please give me a call. Thank you.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
**ATC Associates Inc. | Hygeia Laboratories, Inc.**

---

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Filter Loading Status: COC#20100805

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/09/2010 05:02 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following group of samples cannot be prepared directly due to dusty condition of the cassettes:

A group of P4-00332, P4-00333, P4-00334

A group of P4-00335, P4-00336, P4-00337

A group of P4-00338, P4-00339, P4-00340

A group of P4-00341, P4-00342, P4-00343

A group of P4-00344, P4-00345, P4-00346

A group of P4-00350, P4-00351, P4-00352

A group of P4-00353, P4-00354, P4-00355

A group of P4-00362, P4-00363, P4-00364

A group of P4-00365, P4-00366, P4-00367

A group of P4-00374, P4-00375, P4-00376

A group of P4-00377, P4-00378, P4-00379

A group of P4-00383, P4-00384, P4-00385

If you have any questions, please give me a call. Thank you.

Kyeong Corbin | QA Officer/TEM Laboratory Supervisor  
ATC Associates Inc. | Hygeia Laboratories, Inc.

---

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Filter Loading: COC#20100810

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/12/2010 03:09 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following group of samples cannot be prepared by direct method due to dusty condition:

A group of P4-00416, P4-00417, P4-00418

A group of P4-00419, P4-00420, P4-00421

A group of P4-00454, P4-00455, P4-00456

A group of P4-00434, P4-00435, P4-00436

A group of P4-00446, P4-00447, P4-00448

A group of P4-00460, P4-00461, P4-00462

If you have any questions, please give me a call.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
**ATC Associates Inc. | Hygeia Laboratories, Inc.**

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Filter Loading Status: COC# 20100813

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/16/2010 02:51 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following group of samples cannot be prepared directly due to dusty condition:

A group of P4-00472, P4-00473, P4-00474  
 A group of P4-00475, P4-00476, P4-00477  
 A group of P4-00478, P4-00479, P4-00480  
 A group of P4-00484, P4-00485, P4-00486  
 A group of P4-00487, P4-00488, P4-00489  
 A group of P4-00508, P4-00509, P4-00510  
 A group of P4-00511, P4-00512, P4-00513  
 A group of P4-00515, P4-00516, P4-00517  
 A group of P4-00518, P4-00519, P4-00520  
 A group of P4-00521, P4-00522, P4-00523  
 A group of P4-00524, P4-00525, P4-00526  
 A group of P4-00527, P4-00528, P4-00529  
 A group of P4-00530, P4-00531, P4-00532  
 A group of P4-00533, P4-00534, P4-00535  
 A group of P4-00536, P4-00537, P4-00538  
 A group of P4-00539, P4-00540, P4-00541  
 A group of P4-00545, P4-00546, P4-00547  
 A group of P4-00548, P4-00549, P4-00550  
 A group of P4-00551, P4-00552, P4-00553  
 A group of P4-00557, P4-00558, P4-00559  
 A group of P4-00560, P4-00561, P4-00562  
 A group of P4-00563, P4-00564, P4-00565  
 A group of P4-00566, P4-00567, P4-00568  
 A group of P4-00575, P4-00576, P4-00577  
 A group of P4-00578, P4-00579, P4-00580  
 A group of P4-00581, P4-00582, P4-00583  
 A group of P4-00584, P4-00585, P4-00586  
 A group of P4-00590, P4-00591, P4-00592  
 A group of P4-00593, P4-00594, P4-00595  
 A group of P4-00596, P4-00597, P4-00598  
 A group of P4-00599, P4-00600, P4-00601  
 A group of P4-00602, P4-00602, P4-00603

If you have any questions, please give me a call.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
**ATC Associates Inc. | Hygeia Laboratories, Inc.**

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Filter Loading Status: COC# 20100820

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/23/2010 12:13 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

All 12 samples submitted on this COC are dusty for direct preparation. They are:

A group of P4-00714, P4-00715, P4-00716

A group of P4-00717, P4-00718, P4-00719

A group of P4-00720, P4-00721, P4-00722

A group of P4-00723, P4-00724, P4-00725

If you have any questions, please give me a call. Thank you.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
**ATC Associates Inc. | Hygeia Laboratories, Inc.**

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Filter Loading Status: COC# 20100819

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/25/2010 02:52 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following samples cannot be prepared directly due to dusty condition:

A group of P4-00623, P4-00624, P4-00625  
A group of P4-00626, P4-00627, P4-00628  
A group of P4-00644, P4-00645, P4-00646  
A group of P4-00665, P4-00666, P4-00667  
A group of P4-00671, P4-00672, P4-00673  
A group of P4-00674, P4-00675, P4-00676  
A group of P4-00677, P4-00678, P4-00679  
A group of P4-00680, P4-00681, P4-00682  
A group of P4-00683, P4-00684, P4-00685  
A group of P4-00686, P4-00687, P4-00688  
A group of P4-00689, P4-00690, P4-00691  
A group of P4-00692, P4-00693, P4-00694  
A group of P4-00695, P4-00696, P4-00697  
A group of P4-00698, P4-00699, P4-00700  
A group of P4-00704, P4-00705, P4-00706  
A group of P4-00708, P4-00709, P4-00710  
A group of P4-00711, P4-00712, P4-00713

If you have any questions, please give me a call.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor  
ATC Associates Inc. | Hygeia Laboratories, Inc.**

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Filter Loading Status: COC# 20100827

Kyeong Corbin

to:

'Marriam, Robert R.', Bonita Lavelle

08/30/2010 02:28 PM

Cc:

"John Garr"

Please respond to kyeong.corbin

Show Details

The following samples could not be prepared due to dusty condition:

A group of P4-00726, P4-00727, P4-00728

A group of P4-00729, P4-00730, P4-00731

A group of P4-00739, P4-00740, P4-00741

A group of P4-00742, P4-00743, P4-00744

A group of P4-00745, P4-00746, P4-00747

A group of P4-00751, P4-00752, P4-00753

A group of P4-00754, P4-00755, P4-00756

A group of P4-00760, P4-00761, P4-00762

A group of P4-00766, P4-00767, P4-00768

A group of P4-00769, P4-00770, P4-00771

A group of P4-00784, P4-00785, P4-00786

If you have any questions, please give me a call. Thank you.

**Kyeong Corbin | QA Officer/TEM Laboratory Supervisor**  
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**Selecting samples for indirect prep - OU3 Phase IVA**  
**Bonita Lavelle to: brattin**

08/27/2010 05:47 PM

Hi Bill,

The requirement for indirect preparation of ABS air samples for analysis by TEM will require a revision to Section 6.2 of the Phase IVA SAP (not a field modification).

Here's how I'd like to handle it:

I'll send you the many emails I received from Hygeia that provide the current record of samples numbers for those samples that were overloaded.

Also, Remedium will send me their comprehensive list of the sample numbers and the associated ABS activity and flow rate - we can use this as a second check - I'll send you a copy when I get it.

From the list(s), please select the sample with the highest volume of air collected for each round and activity.

Prepare a Phase IVA SAP revision to include the January 23, 2007 SOP for indirect prep and identify the specific sample numbers.



Indirect Prep\_EPA-LIBBY-08 (signed 01-23-07).pdf

Also, the indirect prep SOP refers to lab mod 53 - I don't know what that is - can you provide me a copy?

sound like a plan?

thanks

Bonnie





RE: Selecting samples for indirect prep - OU3 Phase IVA  
Brattin, Bill to: Bonita Lavelle  
Cc: "Kelly, Erin"

08/30/2010 09:14 AM

I am out on travel today, but Erin is working to create the mod.  
I will send all the files to her.  
I will be back Tuesday

\*\*\*\*\*

Bill Brattin  
SRC, Inc.  
999 18th Street, Suite 1975  
Denver CO 80202  
brattin@srcinc.com  
303-357-3121

---

From: Lavelle.Bonita@epamail.epa.gov [Lavelle.Bonita@epamail.epa.gov]  
Sent: Friday, August 27, 2010 7:47 PM  
To: Brattin, Bill  
Subject: Selecting samples for indirect prep - OU3 Phase IVA

Hi Bill,

The requirement for indirect preparation of ABS air samples for analysis by TEM will require a revision to Section 6.2 of the Phase IVA SAP (not a field modification).

Here's how I'd like to handle it:

I'll send you the many emails I received from Hygeia that provide the current record of samples numbers for those samples that were overloaded.

Also, Remedium will send me their comprehensive list of the sample numbers and the associated ABS activity and flow rate - we can use this as a second check - I'll send you a copy when I get it.

From the list(s), please select the sample with the highest volume of air collected for each round and activity.

Prepare a Phase IVA SAP revision to include the January 23, 2007 SOP for indirect prep and identify the specific sample numbers.

(See attached file: Indirect Prep\_EPA-LIBBY-08 (signed 01-23-07).pdf)

Also, the indirect prep SOP refers to lab mod 53 - I don't know what that is - can you provide me a copy?

sound like a plan?

thanks

Bonnie



**Fw: updated analytical results summary table**  
**Bonita Lavelle to: brattin**

08/30/2010 01:59 PM

From: Bonita Lavelle/R8/USEPA/US  
To: brattin@srcinc.com

Hi Bill,

The attached summary table from Remedium indicates ABS samples that were overloaded in green.

hope this helps with the Phase IVA mod. I got your note - I know you're travelling today - no problem.

Bonnie

----- Forwarded by Bonita Lavelle/R8/USEPA/US on 08/30/2010 01:58 PM -----

From: "Marriam, Robert R." <Robert.R.Marriam@grace.com>  
To: Bonita Lavelle/R8/USEPA/US@EPA  
Cc: "Medler, Robert J." <Robert.J.Medler@grace.com>  
Date: 08/30/2010 01:51 PM  
Subject: RE: updated analytical results summary table

---

Bonnie,

Attached is the updated schedule showing ABS Sampling Results received through 8/26/10.

Robert R. Marriam, Consultant  
Remedium Group, Inc.  
6401 Poplar Ave., Suite 301  
Memphis, TN 38119  
901-820-2023 Office  
901-277-9031 Cell

-----Original Message-----

From: Lavelle.Bonita@epamail.epa.gov  
[mailto:Lavelle.Bonita@epamail.epa.gov]  
Sent: Monday, August 30, 2010 2:41 PM  
To: Marriam, Robert R.  
Subject: updated analytical results summary table

Dear bob,

EPA is working on a modification to the Phase IVA SAP to incorporate indirect preparation of ABS air samples for TEM analysis. The modification will specify the samples to be prepared by indirect methods.

We're working from the emails sent by Hygeia indicating which sample numbers were overloaded. We'll match the sample numbers from the emails with the information on the FSDS sheets to select the samples, selecting the sample with the highest volume (unless there's a technical reason to do something else).

As second check, it would be helpful to have the latest version of the

color coded summary sheet Remedium has prepared to track the Phase IVA samples. Can you send me your latest version?

thanks. If you have any questions, please don't hesitate to call.

Sincerely,

Bonnie Lavelle  
Remedial Project Manager  
Libby Asbestos Superfund Site, OU3  
EPA Region 8  
1595 Wynkoop Street  
8EPR-SR  
Denver, CO 80202-1129

(303) 312-6579

Fax (303) 312-7151



Libby Phase IV ABS Sample Results.xlsx

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00001		Lot BL		NA
P4-00002		Lot BL		NA
P4-00003	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00004	Area 2	2A-Driving to/from Harvest Area	2	
P4-00005	Area 2	2A-Driving to/from Harvest Area	1	
P4-00006	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00007	Area 2	2A-Driving to/from Harvest Area	2	
P4-00008	Area 2	2A-Driving to/from Harvest Area	1	
P4-00009	Area 2	2B-Cutting/Hauling Firewood	4	
P4-00010	Area 2	2B-Cutting/Hauling Firewood	2	
P4-00011	Area 2	2B-Cutting/Hauling Firewood	1	ND
P4-00012	Area 2	2B-Cutting/Hauling Firewood	4	
P4-00013	Area 2	2B-Cutting/Hauling Firewood	2	
P4-00014	Area 2	2B-Cutting/Hauling Firewood	1	ND
P4-00015	Area 2	3A-Trail Maintenance	4	
P4-00016	Area 2	3A-Trail Maintenance	2	
P4-00017	Area 2	3A-Trail Maintenance	1	ND
P4-00018	Area 2	3A-Trail Maintenance	4	
P4-00019	Area 2	3A-Trail Maintenance	2	
P4-00020	Area 2	3A-Trail Maintenance	1	ND
P4-00021	Area 2	3B-Thinning Trees	4	
P4-00022	Area 2	3B-Thinning Trees	2	ND
P4-00023	Area 2	3B-Thinning Trees	1	
P4-00024	Area 2	3B-Thinning Trees	4	
P4-00025	Area 2	3B-Thinning Trees	2	
P4-00026	Area 2	3B-Thinning Trees	1	ND
P4-00027	Area 2	3C-Stand Examination	4	ND
P4-00028	Area 2	3C-Stand Examination	1	
P4-00029	Area 2	3C-Stand Examination	2	
P4-00030	Area 2	3C-Stand Examination	4	ND
P4-00031	Area 2	3C-Stand Examination	2	
P4-00032	Area 2	3C-Stand Examination	1	
P4-00033	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00034	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00035	Area 2	3D-Cutting Fire Lines by Hand	1	0.0385
P4-00036	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00037	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00038	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00041	Area 2	2A-Driving to/from Harvest Area	4	
P4-00042	Area 7	2A-Driving to/from Harvest Area	2	
P4-00043	Area 7	2A-Driving to/from Harvest Area	1	ND
P4-00044	Area 7	2A-Driving to/from Harvest Area	4	ND
P4-00045	Area 7	2A-Driving to/from Harvest Area	2	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00046	Area 7	2A-Driving to/from Harvest Area	1	
P4-00047	Area 7	2B-Cutting/Hauling Firewood	4	
P4-00048	Area 7	2B-Cutting/Hauling Firewood	2	
P4-00049	Area 7	2B-Cutting/Hauling Firewood	1	
P4-00050	Area 7	2B-Cutting/Hauling Firewood	4	
P4-00051	Area 7	2B-Cutting/Hauling Firewood	2	
P4-00052	Area 7	2B-Cutting/Hauling Firewood	1	
P4-00053	Area 7	3A-Trail Maintenance	4	
P4-00054	Area 7	3A-Trail Maintenance	2	ND
P4-00055	Area 7	3A-Trail Maintenance	1	
P4-00056	Area 7	3A-Trail Maintenance	4	
P4-00057	Area 7	3A-Trail Maintenance	2	
P4-00058	Area 7	3A-Trail Maintenance	1	ND
P4-00059	Area 7	3B-Thinning Trees	4	
P4-00060	Area 7	3B-Thinning Trees	2	
P4-00061	Area 7	3B-Thinning Trees	1	
P4-00062	Area 7	3B-Thinning Trees	4	
P4-00063	Area 7	3B-Thinning Trees	2	
P4-00064	Area 7	3B-Thinning Trees	1	ND
P4-00065	Area 7	3C-Stand Examination	4	
P4-00066	Area 7	3C-Stand Examination	2	0.0193
P4-00067	Area 7	3C-Stand Examination	1	
P4-00068	Area 7	3C-Stand Examination	4	ND
P4-00069	Area 7	3C-Stand Examination	2	
P4-00070	Area 7	3C-Stand Examination	1	
P4-00071	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00072	Area 7	3D-Cutting Fire Lines by Hand	2	0.0128
P4-00073	Area 7	3D-Cutting Fire Lines by Hand	1	
P4-00074	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00075	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00076	Area 7	3D-Cutting Fire Lines by Hand	1	0.0770
P4-00077	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00078	Area 10	2A-Driving to/from Harvest Area	2	
P4-00079	Area 10	2A-Driving to/from Harvest Area	1	
P4-00080	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00081	Area 10	2A-Driving to/from Harvest Area	2	
P4-00082	Area 10	2A-Driving to/from Harvest Area	1	
P4-00083	Area 10	2B-Cutting/Hauling Firewood	4	
P4-00084	Area 10	2B-Cutting/Hauling Firewood	2	
P4-00085	Area 10	2B-Cutting/Hauling Firewood	1	
P4-00086	Area 10	2B-Cutting/Hauling Firewood	4	
P4-00087	Area 10	2B-Cutting/Hauling Firewood	2	
P4-00088	Area 10	2B-Cutting/Hauling Firewood	1	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00089	Area 10	3A-Trail Maintenance	4	
P4-00090	Area 10	3A-Trail Maintenance	2	
P4-00091	Area 10	3A-Trail Maintenance	1	ND
P4-00092	Area 10	3A-Trail Maintenance	4	
P4-00093	Area 10	3A-Trail Maintenance	2	
P4-00094	Area 10	3A-Trail Maintenance	1	
P4-00095	Area 10	FB		NA
P4-00096	Area 10	3B-Thinning Trees	4	
P4-00097	Area 10	3B-Thinning Trees	2	
P4-00098	Area 10	3B-Thinning Trees	1	ND
P4-00099	Area 10	3B-Thinning Trees	4	
P4-00100	Area 10	3B-Thinning Trees	2	
P4-00101	Area 10	3B-Thinning Trees	1	
P4-00102	Area 10	3C-Stand Examination	4	
P4-00103	Area 10	3C-Stand Examination	2	
P4-00104	Area 10	3C-Stand Examination	1	ND
P4-00105	Area 10	3C-Stand Examination	4	
P4-00106	Area 10	3C-Stand Examination	2	ND
P4-00107	Area 10	3C-Stand Examination	1	
P4-00108	Area 10	3D-Cutting Fire Lines by Hand	4	
P4-00109	Area 10	3D-Cutting Fire Lines by Hand	2	
P4-00110	Area 10	3D-Cutting Fire Lines by Hand	1	ND
P4-00111	Area 10	3D-Cutting Fire Lines by Hand	4	
P4-00112	Area 10	3D-Cutting Fire Lines by Hand	2	ND
P4-00113	Area 10	3D-Cutting Fire Lines by Hand	1	
P4-00114	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00115	Area 2	2A-Driving to/from Harvest Area	2	
P4-00116	Area 2	2A-Driving to/from Harvest Area	1	
P4-00117	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00118	Area 2	2A-Driving to/from Harvest Area	2	
P4-00119	Area 2	2A-Driving to/from Harvest Area	1	
P4-00120	Area 2	2B.1-Tree Felling and Limbing	4	
P4-00121	Area 2	2B.1-Tree Felling and Limbing	2	
P4-00122	Area 2	2B.1-Tree Felling and Limbing	1	
P4-00123	Area 2	2B.1-Tree Felling and Limbing	4	
P4-00124	Area 2	2B.1-Tree Felling and Limbing	2	
P4-00125	Area 2	2B.1-Tree Felling and Limbing	1	
P4-00126	Area 2	2B.2-Cutting and Stacking	4	
P4-00127	Area 2	2B.2-Cutting and Stacking	2	
P4-00128	Area 2	2B.2-Cutting and Stacking	1	
P4-00129	Area 2	2B.2-Cutting and Stacking	4	
P4-00130	Area 2	2B.2-Cutting and Stacking	2	
P4-00131	Area 2	2B.2-Cutting and Stacking	1	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00132	Area 2	3A-Trail Maintenance	4	
P4-00133	Area 2	3A-Trail Maintenance	2	
P4-00134	Area 2	3A-Trail Maintenance	1	
P4-00135	Area 2	3A-Trail Maintenance	4	
P4-00136	Area 2	3A-Trail Maintenance	2	ND
P4-00137	Area 2	3B-Thinning Trees	1	
P4-00138	Area 2	3B-Thinning Trees	4	
P4-00139	Area 2	3B-Thinning Trees	2	
P4-00140	Area 2	3B-Thinning Trees	1	ND
P4-00141	Area 2	3B-Thinning Trees	4	
P4-00142	Area 2	3B-Thinning Trees	2	
P4-00143	Area 2	3B-Thinning Trees	1	ND
P4-00144	Area 2	3C-Stand Examination	4	
P4-00145	Area 2	3C-Stand Examination	2	
P4-00146	Area 2	3C-Stand Examination	1	
P4-00147	Area 2	3C-Stand Examination	4	
P4-00148	Area 2	3C-Stand Examination	2	
P4-00149	Area 2	3C-Stand Examination	1	ND
P4-00150	Area 2	FB		NA
P4-00151	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00152	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00153	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00154	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00155	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00156	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00157	Area 7	2A-Driving to/from Harvest Area	4	ND
P4-00158	Area 7	2A-Driving to/from Harvest Area	2	
P4-00159	Area 7	2A-Driving to/from Harvest Area	1	
P4-00160	Area 7	2A-Driving to/from Harvest Area	4	ND
P4-00161	Area 7	2A-Driving to/from Harvest Area	2	
P4-00162	Area 7	2A-Driving to/from Harvest Area	1	
P4-00163	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00164	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00165	Area 7	2B.1-Tree Felling and Limbing	1	
P4-00166	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00167	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00168	Area 7	2B.1-Tree Felling and Limbing	1	ND
P4-00169	Area 7	2B.2-Cutting and Stacking	4	
P4-00170	Area 7	2B.2-Cutting and Stacking	2	
P4-00171	Area 7	2B.2-Cutting and Stacking	1	ND
P4-00172	Area 7	2B.2-Cutting and Stacking	4	
P4-00173	Area 7	2B.2-Cutting and Stacking	2	ND
P4-00174	Area 7	2B.2-Cutting and Stacking	1	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00181	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00182	Area 10	2A-Driving to/from Harvest Area	2	
P4-00183	Area 10	2A-Driving to/from Harvest Area	1	
P4-00184	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00185	Area 10	2A-Driving to/from Harvest Area	2	
P4-00186	Area 10	2A-Driving to/from Harvest Area	1	
P4-00187	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00188	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00189	Area 10	2B.1-Tree Felling and Limbing	1	
P4-00190	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00191	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00192	Area 10	2B.1-Tree Felling and Limbing	1	ND
P4-00193	Area 10	2B.2-Cutting and Stacking	4	
P4-00194	Area 10	2B.2-Cutting and Stacking	2	
P4-00195	Area 10	2B.2-Cutting and Stacking	1	ND
P4-00196	Area 10	2B.2-Cutting and Stacking	4	
P4-00197	Area 10	2B.2-Cutting and Stacking	2	
P4-00198	Area 10	2B.2-Cutting and Stacking	1	ND
P4-00199	Area 7	2A-Driving to/from Harvest Area	4	
P4-00200	Area 7	2A-Driving to/from Harvest Area	2	ND
P4-00201	Area 7	2A-Driving to/from Harvest Area	1	
P4-00202	Area 7	2A-Driving to/from Harvest Area	4	ND
P4-00203	Area 7	2A-Driving to/from Harvest Area	25	
P4-00204	Area 7	2A-Driving to/from Harvest Area	1	
P4-00205	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00206	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00207	Area 7	2B.1-Tree Felling and Limbing	1	
P4-00208	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00209	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00210	Area 7	2B.1-Tree Felling and Limbing	1	
P4-00211	Area 7	2B.2-Cutting and Stacking	4	
P4-00212	Area 7	2B.2-Cutting and Stacking	2	
P4-00213	Area 7	2B.2-Cutting and Stacking	1	
P4-00214	Area 7	2B.2-Cutting and Stacking	4	
P4-00215	Area 7	2B.2-Cutting and Stacking	2	
P4-00216	Area 7	2B.2-Cutting and Stacking	1	
P4-00217	Area 7	3A-Trail Maintenance	4	
P4-00218	Area 7	3A-Trail Maintenance	2	
P4-00219	Area 7	3A-Trail Maintenance	1	ND
P4-00220	Area 7	3A-Trail Maintenance	4	
P4-00221	Area 7	3A-Trail Maintenance	2	
P4-00222	Area 7	3A-Trail Maintenance	1	
P4-00223	Area 7	3B-Thinning Trees	4	ND



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00224	Area 7	3B-Thinning Trees	2	
P4-00225	Area 7	3B-Thinning Trees	1	
P4-00226	Area 7	3B-Thinning Trees	4	
P4-00227	Area 7	3B-Thinning Trees	2	
P4-00228	Area 7	3B-Thinning Trees	1	
P4-00229	Area 7	3C-Stand Examination	4	
P4-00230	Area 7	3C-Stand Examination	2	
P4-00231	Area 7	3C-Stand Examination	1	
P4-00232	Area 7	3C-Stand Examination	4	
P4-00233	Area 7	3C-Stand Examination	2	
P4-00234	Area 7	3C-Stand Examination	1	
P4-00235	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00236	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00237	Area 7	3D-Cutting Fire Lines by Hand	1	ND
P4-00238	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00239	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00240	Area 7	3D-Cutting Fire Lines by Hand	1	ND
P4-00241	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00242	Area 10	2A-Driving to/from Harvest Area	2	
P4-00243	Area 10	2A-Driving to/from Harvest Area	1	
P4-00244	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00245	Area 10	2A-Driving to/from Harvest Area	2	
P4-00246	Area 10	2A-Driving to/from Harvest Area	1	
P4-00247	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00248	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00249	Area 10	2B.1-Tree Felling and Limbing	1	
P4-00250	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00251	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00252	Area 10	2B.1-Tree Felling and Limbing	1	
P4-00253	Area 10	2B.2-Cutting and Stacking	4	
P4-00254	Area 10	2B.2-Cutting and Stacking	2	
P4-00255	Area 10	2B.2-Cutting and Stacking	1	
P4-00256	Area 10	2B.2-Cutting and Stacking	4	
P4-00257	Area 10	2B.2-Cutting and Stacking	2	
P4-00258	Area 10	2B.2-Cutting and Stacking	1	
P4-00259	Area 10	3A-Trail Maintenance	4	ND
P4-00260	Area 10	3A-Trail Maintenance	2	
P4-00261	Area 10	3A-Trail Maintenance	1	
P4-00262	Area 10	3A-Trail Maintenance	4	
P4-00263	Area 10	3A-Trail Maintenance	2	ND
P4-00264	Area 10	3A-Trail Maintenance	1	
P4-00265	Area 10	3B-Thinning Trees	4	
P4-00266	Area 10	3B-Thinning Trees	2	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00267	Area 10	3B-Thinning Trees	1	
P4-00268	Area 10	3B-Thinning Trees	4	
P4-00269	Area 10	3B-Thinning Trees	2	
P4-00270	Area 10	3B-Thinning Trees	1	
P4-00271	Area 10	3C-Stand Examination	4	
P4-00272	Area 10	3C-Stand Examination	2	
P4-00273	Area 10	3C-Stand Examination	1	ND
P4-00274	Area 10	3C-Stand Examination	4	
P4-00275	Area 10	3C-Stand Examination	2	ND
P4-00276	Area 10	3C-Stand Examination	1	
P4-00277	Area 10	3D-Cutting Fire Lines by Hand	4	ND
P4-00278	Area 10	3D-Cutting Fire Lines by Hand	2	
P4-00279	Area 10	3D-Cutting Fire Lines by Hand	1	
P4-00280	Area 10	3D-Cutting Fire Lines by Hand	4	ND
P4-00281	Area 10	3D-Cutting Fire Lines by Hand	2	
P4-00282	Area 10	3D-Cutting Fire Lines by Hand	1	
P4-00283	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00284	Area 2	2A-Driving to/from Harvest Area	2	
P4-00285	Area 2	2A-Driving to/from Harvest Area	1	
P4-00286	Area 2	2A-Driving to/from Harvest Area	4	ND
P4-00287	Area 2	2A-Driving to/from Harvest Area	2	
P4-00288	Area 2	2A-Driving to/from Harvest Area	1	
P4-00289	Area 2	2B.1-Tree Felling and Limbing	4	
P4-00290	Area 2	2B.1-Tree Felling and Limbing	2	
P4-00291	Area 2	2B.1-Tree Felling and Limbing	1	
P4-00292	Area 2	2B.1-Tree Felling and Limbing	4	
P4-00293	Area 2	2B.1-Tree Felling and Limbing	2	
P4-00294	Area 2	2B.1-Tree Felling and Limbing	1	
P4-00295	Area 2	2B.2-Cutting and Stacking	4	
P4-00296	Area 2	2B.2-Cutting and Stacking	2	
P4-00297	Area 2	2B.2-Cutting and Stacking	1	
P4-00298	Area 2	2B.2-Cutting and Stacking	4	
P4-00299	Area 2	2B.2-Cutting and Stacking	2	
P4-00300	Area 2	2B.2-Cutting and Stacking	1	
P4-00301	Area 2	3A-Trail Maintenance	4	
P4-00302	Area 2	3A-Trail Maintenance	2	
P4-00303	Area 2	3A-Trail Maintenance	1	ND
P4-00304	Area 2	3A-Trail Maintenance	4	
P4-00305	Area 2	3A-Trail Maintenance	2	
P4-00306	Area 2	3A-Trail Maintenance	1	ND
P4-00307	Area 2	3B-Thinning Trees	4	
P4-00308	Area 2	3B-Thinning Trees	2	
P4-00309	Area 2	3B-Thinning Trees	1	ND

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00310	Area 2	3B-Thinning Trees	4	
P4-00311	Area 2	3B-Thinning Trees	2	
P4-00312	Area 2	3B-Thinning Trees	1	
P4-00313	Area 2	3C-Stand Examination	4	
P4-00314	Area 2	3C-Stand Examination	2	
P4-00315	Area 2	3C-Stand Examination	1	
P4-00316	Area 2	3C-Stand Examination	4	
P4-00317	Area 2	3C-Stand Examination	2	
P4-00318	Area 2	3C-Stand Examination	1	ND
P4-00319	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00320	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00321	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00322	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00323	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00324	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00325	Area 2	FB		NA
P4-00326	Area 7	2A-Driving to/from Harvest Area	4	
P4-00327	Area 7	2A-Driving to/from Harvest Area	2	
P4-00328	Area 7	2A-Driving to/from Harvest Area	1	ND
P4-00329	Area 7	2A-Driving to/from Harvest Area	4	
P4-00330	Area 7	2A-Driving to/from Harvest Area	2	ND
P4-00331	Area 7	2A-Driving to/from Harvest Area	1	
P4-00332	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00333	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00334	Area 7	2B.1-Tree Felling and Limbing	1	
P4-00335	Area 7	2B.1-Tree Felling and Limbing	4	
P4-00336	Area 7	2B.1-Tree Felling and Limbing	2	
P4-00337	Area 7	2B.1-Tree Felling and Limbing	1	
P4-00338	Area 7	2B.2-Cutting and Stacking	4	
P4-00339	Area 7	2B.2-Cutting and Stacking	2	
P4-00340	Area 7	2B.2-Cutting and Stacking	1	
P4-00341	Area 7	2B.2-Cutting and Stacking	4	
P4-00342	Area 7	2B.2-Cutting and Stacking	2	
P4-00343	Area 7	2B.2-Cutting and Stacking	1	
P4-00344	Area 7	3A-Trail Maintenance	4	
P4-00345	Area 7	3A-Trail Maintenance	2	
P4-00346	Area 7	3A-Trail Maintenance	1	
P4-00347	Area 7	3A-Trail Maintenance	4	
P4-00348	Area 7	3A-Trail Maintenance	2	
P4-00349	Area 7	3A-Trail Maintenance	1	ND
P4-00350	Area 7	3B-Thinning Trees	4	
P4-00351	Area 7	3B-Thinning Trees	2	
P4-00352	Area 7	3B-Thinning Trees	1	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			
P4-00353	Area 7	3B-Thinning Trees	4	
P4-00354	Area 7	3B-Thinning Trees	2	
P4-00355	Area 7	3B-Thinning Trees	1	
P4-00356	Area 7	3C-Stand Examination	4	
P4-00357	Area 7	3C-Stand Examination	2	
P4-00358	Area 7	3C-Stand Examination	1	ND
P4-00359	Area 7	3C-Stand Examination	4	
P4-00360	Area 7	3C-Stand Examination	2	
P4-00361	Area 7	3C-Stand Examination	1	
P4-00362	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00363	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00364	Area 7	3D-Cutting Fire Lines by Hand	1	
P4-00365	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00366	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00367	Area 7	3D-Cutting Fire Lines by Hand	1	
P4-00368	Area 10	2A-Driving to/from Harvest Area	4	
P4-00369	Area 10	2A-Driving to/from Harvest Area	2	
P4-00370	Area 10	2A-Driving to/from Harvest Area	1	ND
P4-00371	Area 10	2A-Driving to/from Harvest Area	4	ND
P4-00372	Area 10	2A-Driving to/from Harvest Area	2	
P4-00373	Area 10	2A-Driving to/from Harvest Area	1	
P4-00374	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00375	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00376	Area 10	2B.1-Tree Felling and Limbing	1	
P4-00377	Area 10	2B.1-Tree Felling and Limbing	4	
P4-00378	Area 10	2B.1-Tree Felling and Limbing	2	
P4-00379	Area 10	2B.1-Tree Felling and Limbing	1	
P4-00380	Area 10	2B.2-Cutting and Stacking	4	
P4-00381	Area 10	2B.2-Cutting and Stacking	2	
P4-00382	Area 10	2B.2-Cutting and Stacking	1	
P4-00383	Area 10	2B.2-Cutting and Stacking	4	
P4-00384	Area 10	2B.2-Cutting and Stacking	2	
P4-00385	Area 10	2B.2-Cutting and Stacking	1	
P4-00386	Area 10	3A-Trail Maintenance	4	
P4-00387	Area 10	3A-Trail Maintenance	2	
P4-00388	Area 10	3A-Trail Maintenance	1	
P4-00389	Area 10	3A-Trail Maintenance	4	
P4-00390	Area 10	3A-Trail Maintenance	2	
P4-00391	Area 10	3A-Trail Maintenance	1	
P4-00392	Area 10	3B-Thinning Trees	4	
P4-00393	Area 10	3B-Thinning Trees	2	
P4-00394	Area 10	3B-Thinning Trees	1	
P4-00395	Area 10	3B-Thinning Trees	4	

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00396	Area 10	3B-Thinning Trees	2	
P4-00397	Area 10	3B-Thinning Trees	1	
P4-00398	Area 10	3C-Stand Examination	4	
P4-00399	Area 10	3C-Stand Examination	2	
P4-00400	Area 10	3C-Stand Examination	1	
P4-00401	Area 10	3C-Stand Examination	4	
P4-00402	Area 10	3C-Stand Examination	2	
P4-00403	Area 10	3C-Stand Examination	1	
P4-00404	Area 10	3D-Cutting Fire Lines by Hand	4	
P4-00405	Area 10	3D-Cutting Fire Lines by Hand	2	
P4-00406	Area 10	3D-Cutting Fire Lines by Hand	1	
P4-00407	Area 10	3D-Cutting Fire Lines by Hand	4	
P4-00408	Area 10	3D-Cutting Fire Lines by Hand	2	
P4-00409	Area 10	3D-Cutting Fire Lines by Hand	1	
P4-00410	Area 2	2A-Driving to/from Harvest Area	4	
P4-00411	Area 2	2A-Driving to/from Harvest Area	2	
P4-00412	Area 2	2A-Driving to/from Harvest Area	1	
P4-00413	Area 2	2A-Driving to/from Harvest Area	4	
P4-00414	Area 2	2A-Driving to/from Harvest Area	2	
P4-00415	Area 2	2A-Driving to/from Harvest Area	1	
P4-00416	Area 2	2B.1a-Tree Felling and Limbing	4	
P4-00417	Area 2	2B.1a-Tree Felling and Limbing	2	
P4-00418	Area 2	2B.1a-Tree Felling and Limbing	1	
P4-00419	Area 2	2B.1a-Tree Felling and Limbing	4	
P4-00420	Area 2	2B.1a-Tree Felling and Limbing	2	
P4-00421	Area 2	2B.1a-Tree Felling and Limbing	1	
P4-00454	Area 2	2B.1b-Tree Felling and Limbing	4	
P4-00455	Area 2	2B.1b-Tree Felling and Limbing	2	
P4-00456	Area 2	2B.1b-Tree Felling and Limbing	1	
P4-00457	Area 2	2B.1b-Tree Felling and Limbing	4	
P4-00458	Area 2	2B.1b-Tree Felling and Limbing	2	
P4-00459	Area 2	2B.1b-Tree Felling and Limbing	1	
P4-00428	Area 2	3A-Trail Maintenance	4	
P4-00429	Area 2	3A-Trail Maintenance	2	
P4-00430	Area 2	3A-Trail Maintenance	1	
P4-00431	Area 2	3A-Trail Maintenance	4	
P4-00432	Area 2	3A-Trail Maintenance	2	
P4-00433	Area 2	3A-Trail Maintenance	1	
P4-00434	Area 2	3B-Thinning Trees	4	
P4-00435	Area 2	3B-Thinning Trees	2	
P4-00436	Area 2	3B-Thinning Trees	1	
P4-00437	Area 2	3B-Thinning Trees	4	
P4-00438	Area 2	3B-Thinning Trees	2	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00439	Area 2	3B-Thinning Trees	1	
P4-00440	Area 2	3C-Stand Examination	4	
P4-00441	Area 2	3C-Stand Examination	2	
P4-00442	Area 2	3C-Stand Examination	1	
P4-00443	Area 2	3C-Stand Examination	4	
P4-00444	Area 2	3C-Stand Examination	2	
P4-00445	Area 2	3C-Stand Examination	1	
P4-00446	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00447	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00448	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00449	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00450	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00451	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00452	Lot Blank			
P4-00453	Lot Blank			
P4-00460	Area 2	2B.2-Cutting and Stacking	4	
P4-00461	Area 2	2B.3-	2	
P4-00462	Area 2	2B.4-	1	
P4-00463	Area 2	2B.5-	4	
P4-00464	Area 2	2B.6-	2	
P4-00465	Area 2	2B.7-	1	
P4-00466	Area 7	2A-Driving to/from Harvest Area	4	
P4-00467	Area 7	2A-Driving to/from Harvest Area	2	
P4-00468	Area 7	2A-Driving to/from Harvest Area	1	
P4-00469	Area 7	2A-Driving to/from Harvest Area	4	
P4-00470	Area 7	2A-Driving to/from Harvest Area	2	
P4-00471	Area 7	2A-Driving to/from Harvest Area	1	
P4-00472	Area 7	2B.1a-Tree Felling and Limbing	4	
P4-00473	Area 7	2B.1a-Tree Felling and Limbing	2	
P4-00474	Area 7	2B.1a-Tree Felling and Limbing	1	
P4-00475	Area 7	2B.1a-Tree Felling and Limbing	4	
P4-00476	Area 7	2B.1a-Tree Felling and Limbing	2	
P4-00477	Area 7	2B.1a-Tree Felling and Limbing	1	
P4-00478	Area 7	2B.1b-Tree Felling and Limbing	4	
P4-00479	Area 7	2B.1b-Tree Felling and Limbing	2	
P4-00480	Area 7	2B.1b-Tree Felling and Limbing	1	
P4-00481	Area 7	2B.1b-Tree Felling and Limbing	4	
P4-00482	Area 7	2B.1b-Tree Felling and Limbing	2	
P4-00483	Area 7	2B.1b-Tree Felling and Limbing	1	
P4-00484	Area 7	2B.2b-	4	
P4-00485	Area 7	2B.2b-	2	
P4-00486	Area 7	2B.2b-	1	
P4-00487	Area 7	2B.2b-	4	

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00488	Area 7	2B.2b-	2	
P4-00489	Area 7	2B.2b-	1	
P4-00490	Area 7	3A-Trail Maintenance	4	
P4-00491	Area 7	3A-Trail Maintenance	2	
P4-00492	Area 7	3A-Trail Maintenance	1	
P4-00493	Area 7	3A-Trail Maintenance	4	
P4-00494	Area 7	3A-Trail Maintenance	2	
P4-00495	Area 7	3A-Trail Maintenance	1	
P4-00496	Area 7	3B-Thinning Trees	4	
P4-00497	Area 7	3B-Thinning Trees	2	
P4-00498	Area 7	3B-Thinning Trees	1	
P4-00499	Area 7	3B-Thinning Trees	4	
P4-00500	Area 7	3B-Thinning Trees	2	
P4-00501	Area 7	3B-Thinning Trees	1	
P4-00502	Area 7	3C-Stand Examination	4	
P4-00503	Area 7	3C-Stand Examination	2	
P4-00504	Area 7	3C-Stand Examination	1	
P4-00505	Area 7	3C-Stand Examination	4	
P4-00506	Area 7	3C-Stand Examination	2	
P4-00507	Area 7	3C-Stand Examination	1	
P4-00508	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00509	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00510	Area 7	3D-Cutting Fire Lines by Hand	1	
P4-00511	Area 7	3D-Cutting Fire Lines by Hand	4	
P4-00512	Area 7	3D-Cutting Fire Lines by Hand	2	
P4-00513	Area 7	3D-Cutting Fire Lines by Hand	1	
P4-00514	Area 7	FB		
P4-00515	Area 10	2A-Driving to/from Harvest Area	4	
P4-00516	Area 10	2A-Driving to/from Harvest Area	2	
P4-00517	Area 10	2A-Driving to/from Harvest Area	1	
P4-00518	Area 10	2A-Driving to/from Harvest Area	4	
P4-00519	Area 10	2A-Driving to/from Harvest Area	2	
P4-00520	Area 10	2A-Driving to/from Harvest Area	1	
P4-00521	Area 10	2B.1b-Tree Felling and Limbing	4	
P4-00522	Area 10	2B.1b-Tree Felling and Limbing	2	
P4-00523	Area 10	2B.1b-Tree Felling and Limbing	1	
P4-00524	Area 10	2B.1b-Tree Felling and Limbing	4	
P4-00525	Area 10	2B.1b-Tree Felling and Limbing	2	
P4-00526	Area 10	2B.1b-Tree Felling and Limbing	1	
P4-00527	Area 10	3A-Trail Maintenance	4	
P4-00528	Area 10	3A-Trail Maintenance	2	
P4-00529	Area 10	3A-Trail Maintenance	1	
P4-00530	Area 10	3A-Trail Maintenance	4	



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00531	Area 10	3A-Trail Maintenance	2
P4-00532	Area 10	3A-Trail Maintenance	1
P4-00533	Area 10	3B-Thinning Trees	4
P4-00534	Area 10	3B-Thinning Trees	2
P4-00535	Area 10	3B-Thinning Trees	1
P4-00536	Area 10	3B-Thinning Trees	4
P4-00537	Area 10	3B-Thinning Trees	2
P4-00538	Area 10	3B-Thinning Trees	1
P4-00539	Area 10	3C-Stand Examination	4
P4-00540	Area 10	3C-Stand Examination	2
P4-00541	Area 10	3C-Stand Examination	1
P4-00542	Area 10	3C-Stand Examination	4
P4-00543	Area 10	3C-Stand Examination	2
P4-00544	Area 10	3C-Stand Examination	1
P4-00545	Area 10	3D-Cutting Fire Lines by Hand	4
P4-00546	Area 10	3D-Cutting Fire Lines by Hand	2
P4-00547	Area 10	3D-Cutting Fire Lines by Hand	1
P4-00548	Area 10	3D-Cutting Fire Lines by Hand	4
P4-00549	Area 10	3D-Cutting Fire Lines by Hand	2
P4-00550	Area 10	3D-Cutting Fire Lines by Hand	1
P4-00551	Area 2	2A-Driving to/from Harvest Area	4
P4-00552	Area 2	2A-Driving to/from Harvest Area	2
P4-00553	Area 2	2A-Driving to/from Harvest Area	1
P4-00554	Area 2	2A-Driving to/from Harvest Area	4
P4-00555	Area 2	2A-Driving to/from Harvest Area	2
P4-00556	Area 2	2A-Driving to/from Harvest Area	1
P4-00557	Area 2	2B.1a-Tree Felling and Limbing	4
P4-00558	Area 2	2B.1a-Tree Felling and Limbing	2
P4-00559	Area 2	2B.1a-Tree Felling and Limbing	1
P4-00560	Area 2	2B.1a-Tree Felling and Limbing	4
P4-00561	Area 2	2B.1a-Tree Felling and Limbing	2
P4-00562	Area 2	2B.1a-Tree Felling and Limbing	1
P4-00563	Area 2	2B.1b-Tree Felling and Limbing	4
P4-00564	Area 2	2B.1b-Tree Felling and Limbing	2
P4-00565	Area 2	2B.1b-Tree Felling and Limbing	1
P4-00566	Area 2	2B.1b-Tree Felling and Limbing	4
P4-00567	Area 2	2B.1b-Tree Felling and Limbing	2
P4-00568	Area 2	2B.1b-Tree Felling and Limbing	1
P4-00569	Area 2	2B.2	4
P4-00570	Area 2	2B.2	2
P4-00571	Area 2	2B.2	1
P4-00572	Area 2	2B.2	4
P4-00573	Area 2	2B.2	2



# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00574	Area 2	2B.2	1	
P4-00575	Area 2	3A-Trail Maintenance	4	
P4-00576	Area 2	3A-Trail Maintenance	2	
P4-00577	Area 2	3A-Trail Maintenance	1	
P4-00578	Area 2	3A-Trail Maintenance	4	
P4-00579	Area 2	3A-Trail Maintenance	2	
P4-00580	Area 2	3A-Trail Maintenance	1	
P4-00581	Area 2	3B-Thinning Trees	4	
P4-00582	Area 2	3B-Thinning Trees	2	
P4-00583	Area 2	3B-Thinning Trees	1	
P4-00584	Area 2	3B-Thinning Trees	4	
P4-00585	Area 2	3B-Thinning Trees	2	
P4-00586	Area 2	3B-Thinning Trees	1	
P4-00587	Area 2	3C-Stand Examination	4	
P4-00588	Area 2	3C-Stand Examination	2	
P4-00589	Area 2	3C-Stand Examination	1	
P4-00590	Area 2	3C-Stand Examination	4	
P4-00591	Area 2	3C-Stand Examination	2	
P4-00592	Area 2	3C-Stand Examination	1	
P4-00593	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00594	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00595	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00596	Area 2	3D-Cutting Fire Lines by Hand	4	
P4-00597	Area 2	3D-Cutting Fire Lines by Hand	2	
P4-00598	Area 2	3D-Cutting Fire Lines by Hand	1	
P4-00599	Area 10	2B.1a-Tree Felling and Limbing	4	
P4-00600	Area 10	2B.1a-Tree Felling and Limbing	2	
P4-00601	Area 10	2B.1a-Tree Felling and Limbing	1	
P4-00602	Area 10	2B.1a-Tree Felling and Limbing	4	
P4-00603	Area 10	2B.1a-Tree Felling and Limbing	2	
P4-00604	Area 10	2B.1a-Tree Felling and Limbing	1	
P4-00605	Area 10	2B.2	4	
P4-00606	Area 10	2B.2	2	
P4-00607	Area 10	2B.2	1	
P4-00608	Area 10	2B.2	4	
P4-00609	Area 10	2B.2	2	
P4-00610	Area 10	2B.2	1	
P4-00611				
P4-00612				
P4-00613				
P4-00614				
P4-00615				
P4-00616				

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00617

P4-00618

P4-00619

P4-00620

P4-00621

P4-00622

P4-00623

P4-00624

P4-00625

P4-00626

P4-00627

P4-00628

P4-00629

P4-00630

P4-00631

P4-00632

P4-00633

P4-00634

P4-00635

P4-00636

P4-00637

P4-00638

P4-00639

P4-00640

P4-00641

P4-00642

P4-00643

P4-00644

P4-00645

P4-00646

P4-00647

P4-00648

P4-00649

P4-00650

P4-00651

P4-00652

P4-00653

P4-00654

P4-00655

P4-00656

P4-00657

P4-00658

P4-00659

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00660

P4-00661

P4-00662

P4-00663

P4-00664

P4-00665

P4-00666

P4-00667

P4-00668

P4-00669

P4-00670

P4-00671

P4-00672

P4-00673

P4-00674

P4-00675

P4-00676

P4-00677

P4-00678

P4-00679

P4-00680

P4-00681

P4-00682

P4-00683

P4-00684

P4-00685

P4-00686

P4-00687

P4-00688

P4-00689

P4-00690

P4-00691

P4-00692

P4-00693

P4-00694

P4-00695

P4-00696

P4-00697

P4-00698

P4-00699

P4-00700

P4-00701

P4-00702

# OU3 PHASE IV ABS ANALYTICAL RESULTS

Last Update 8/26/10-2

ID NO.	AREA	ACTIVITY	FLOW	ANALYTICAL RESULT
ARCHIVED	OVERLOAD			
BLANK	ANALYZED			

P4-00703

P4-00704

P4-00705

P4-00706

P4-00707

P4-00708

P4-00709

P4-00710

P4-00711

P4-00712

P4-00713

P4-00714

P4-00715

P4-00716

P4-00717

P4-00718

P4-00719

P4-00720

P4-00721

P4-00722

P4-00723

P4-00724

P4-00725



Indirect Prep SOP  
Marriam, Robert R.

to:

Bonita Lavelle

09/01/2010 02:29 PM

Cc:

"Medler, Robert J.", "Gardner, Lynne G."

Show Details

Bonnie

Our Legal Counsel reviewed the SOP and would like the following language to be part of the laboratory report when the indirect prep method is used. The language is taken almost verbatim from the ASTM D-5755 method, sections 1.4.1 and 5.2. That method was the result of a peer review process and originally approved by ASTM in 1995.

"The samples were analyzed with a test method that employs an indirect sample preparation technique. That technique is intended to disperse aggregated asbestos into fundamental fibrils, fiber bundles, clusters, or matrices that can be more accurately quantified by transmission electron microscopy. However, as with all indirect sample preparation techniques, the asbestos observed for quantification may not represent the physical form of the asbestos as sampled. More specifically, the procedure described neither creates nor destroys asbestos, but it may alter the physical form of the mineral fibers. Thus, a single, large asbestos containing particle (from the large end of the particle size distribution) dispersed during sample preparation may result in anomalously large asbestos surface loading results in the TEM analyses of that sample."

I don't think that this is anything that should be a problem to include. Let me know what you think.

Robert R. Marriam, Consultant  
Remedium Group, Inc.  
6401 Poplar Ave., Suite 301  
Memphis, TN 38119  
901-820-2023 Office  
901-277-9031 Cell



**Fw: OU3 Phase 4a Sample Status**  
**Bonita Lavelle** to: kyeong.corbin  
Cc: Robert.R.Marriam

09/08/2010 04:23 PM

Dear Kyeong,

EPA is preparing a modification to the OU3 Phase IV Sampling and Analysis Plan to incorporate indirect preparation of air samples for TEM analysis. The modification will include a list of specific samples to be prepared using indirect methods.

I asked SRC to develop the list of samples based on information from Hygeia on overloading. The email message below identifies samples for which we don't yet have loading information. Can you please provide?

thank you.

Sincerely,

Bonnie Lavelle  
Remedial Project Manager  
Libby Asbestos Superfund Site, OU3  
EPA Region 8  
1595 Wynkoop Street  
8EPR-SR  
Denver, CO 80202-1129

(303) 312-6579

Fax (303) 312-7151

— Forwarded by Bonita Lavelle/R8/USEPA/US on 09/08/2010 04:15 PM —

From: "Brattin, Bill" <brattin@srcinc.com>  
To: Bonita Lavelle/R8/USEPA/US@EPA  
Date: 09/08/2010 03:45 PM  
Subject: FW: OU3 Phase 4a Sample Status

Bonnie

Here is the list of Phase 4A ABS samples where we do not yet have official word from Hygeia on loading status and whether a direct prep could be done.

Please ask for an update so we can finalize the mod on indirect prep.

\*\*\*\*\*

Bill Brattin  
SRC, Inc.  
999 18th Street Suite 1975  
Denver CO 80202  
Phone: 303-357-3121  
Fax: 303-292-4755  
e-mail: [brattin@srcinc.com](mailto:brattin@srcinc.com)

**From:** Kelly, Erin

**Sent:** Wednesday, September 08, 2010 3:27 PM

**To:** Brattin, Bill

**Subject:** OU3 Phase 4a Sample Status

Bill,

As of today, it is unknown if the following samples (N = 160) are overloaded or have been prepared directly. 102 of these samples fall into the high priority analysis category. Please let me know if you have any questions or would like me to modify the table below.

Sample ID	Scenario	High Priority
P4-00199	2a Residential wood harvester driving	
P4-00200	2a Residential wood harvester driving	
P4-00201	2a Residential wood harvester driving	
P4-00202	2a Residential wood harvester driving	
P4-00203	2a Residential wood harvester driving	
P4-00204	2a Residential wood harvester driving	
P4-00217	3a USFS worker trail maintenance	
P4-00218	3a USFS worker trail maintenance	
P4-00219	3a USFS worker trail maintenance	
P4-00223	3b USFS worker thinning trees	
P4-00224	3b USFS worker thinning trees	
P4-00225	3b USFS worker thinning trees	
P4-00416	2b.1 Felling and limbing	
P4-00417	2b.1 Felling and limbing	
P4-00418	2b.1 Felling and limbing	
P4-00419	2b.1 Felling and limbing	
P4-00420	2b.1 Felling and limbing	
P4-00421	2b.1 Felling and limbing	
P4-00434	3b USFS worker thinning trees	
P4-00435	3b USFS worker thinning trees	
P4-00436	3b USFS worker thinning trees	
P4-00446	3d Cutting firelines by hand	x
P4-00447	3d Cutting firelines by hand	x
P4-00448	3d Cutting firelines by hand	x
P4-00454	3d Cutting firelines by hand	x



P4-00455	3d Cutting firelines by hand	x
P4-00456	3d Cutting firelines by hand	x
P4-00460	3d Cutting firelines by hand	x
P4-00461	3d Cutting firelines by hand	x
P4-00462	3d Cutting firelines by hand	x
P4-00466	3d Cutting firelines by hand	x
P4-00467	3d Cutting firelines by hand	x
P4-00468	3d Cutting firelines by hand	x
P4-00469	3d Cutting firelines by hand	x
P4-00470	3d Cutting firelines by hand	x
P4-00471	3d Cutting firelines by hand	x
P4-00481	3d Cutting firelines by hand	x
P4-00482	3d Cutting firelines by hand	x
P4-00483	3d Cutting firelines by hand	x
P4-00490	3d Cutting firelines by hand	x
P4-00491	3d Cutting firelines by hand	x
P4-00492	3d Cutting firelines by hand	x
P4-00493	3d Cutting firelines by hand	x
P4-00494	3d Cutting firelines by hand	x
P4-00495	3d Cutting firelines by hand	x
P4-00496	3d Cutting firelines by hand	x
P4-00497	3d Cutting firelines by hand	x
P4-00498	3d Cutting firelines by hand	x
P4-00499	3d Cutting firelines by hand	x
P4-00500	3d Cutting firelines by hand	x
P4-00501	3d Cutting firelines by hand	x
P4-00502	3d Cutting firelines by hand	x
P4-00503	3d Cutting firelines by hand	x
P4-00504	3d Cutting firelines by hand	x
P4-00505	3d Cutting firelines by hand	x
P4-00506	3d Cutting firelines by hand	x
P4-00507	3d Cutting firelines by hand	x
P4-00542	3d Cutting firelines by hand	x
P4-00543	3d Cutting firelines by hand	x
P4-00544	3d Cutting firelines by hand	x
P4-00554	3d Cutting firelines by hand	x
P4-00555	3d Cutting firelines by hand	x
P4-00556	3d Cutting firelines by hand	x
P4-00569	3d Cutting firelines by hand	x
P4-00570	3d Cutting firelines by hand	x



P4-00571	3d Cutting firelines by hand	x
P4-00572	3d Cutting firelines by hand	x
P4-00573	3d Cutting firelines by hand	x
P4-00574	3d Cutting firelines by hand	x
P4-00587	3d Cutting firelines by hand	x
P4-00588	3d Cutting firelines by hand	x
P4-00589	3d Cutting firelines by hand	x
P4-00604	2b.1 Felling and limbing	
P4-00605	2b.2 Cutting and stacking	
P4-00606	2b.2 Cutting and stacking	
P4-00607	2b.2 Cutting and stacking	
P4-00608	2b.2 Cutting and stacking	
P4-00609	2b.2 Cutting and stacking	
P4-00610	2b.2 Cutting and stacking	
P4-00617	3a USFS worker trail maintenance	
P4-00618	3a USFS worker trail maintenance	
P4-00619	3a USFS worker trail maintenance	
P4-00620	3a USFS worker trail maintenance	
P4-00621	3a USFS worker trail maintenance	
P4-00622	3a USFS worker trail maintenance	
P4-00629	3c USFS worker stand exam	
P4-00630	3c USFS worker stand exam	
P4-00631	3c USFS worker stand exam	
P4-00632	3c USFS worker stand exam	
P4-00633	3c USFS worker stand exam	
P4-00634	3c USFS worker stand exam	
P4-00635	3d Cutting firelines by hand	x
P4-00636	3d Cutting firelines by hand	x
P4-00637	3d Cutting firelines by hand	x
P4-00638	3d Cutting firelines by hand	x
P4-00639	3d Cutting firelines by hand	x
P4-00640	3d Cutting firelines by hand	x
P4-00641	3a USFS worker trail maintenance	
P4-00642	3a USFS worker trail maintenance	
P4-00643	3a USFS worker trail maintenance	
P4-00647	3b USFS worker thinning trees	
P4-00648	3b USFS worker thinning trees	
P4-00649	3b USFS worker thinning trees	
P4-00650	3b USFS worker thinning trees	
P4-00651	3b USFS worker thinning trees	

P4-00652	3b USFS worker thinning trees	
P4-00653	3c USFS worker stand exam	
P4-00654	3c USFS worker stand exam	
P4-00655	3c USFS worker stand exam	
P4-00656	3c USFS worker stand exam	
P4-00657	3c USFS worker stand exam	
P4-00658	3c USFS worker stand exam	
P4-00659	3d Cutting firelines by hand	x
P4-00660	3d Cutting firelines by hand	x
P4-00661	3d Cutting firelines by hand	x
P4-00662	3d Cutting firelines by hand	x
P4-00663	3d Cutting firelines by hand	x
P4-00664	3d Cutting firelines by hand	x
P4-00668	1 Recreational visitor hiking	
P4-00669	1 Recreational visitor hiking	
P4-00670	1 Recreational visitor hiking	
P4-00701	3e Cutting firelines with heavy equipment	x
P4-00702	3e Cutting firelines with heavy equipment	x
P4-00703	3e Cutting firelines with heavy equipment	x
P4-00732	3e Cutting firelines with heavy equipment	x
P4-00733	3e Cutting firelines with heavy equipment	x
P4-00734	3e Cutting firelines with heavy equipment	x
P4-00735	3e Cutting firelines with heavy equipment	x
P4-00736	3e Cutting firelines with heavy equipment	x
P4-00737	3e Cutting firelines with heavy equipment	x
P4-00748	3e Cutting firelines with heavy equipment	x
P4-00749	3e Cutting firelines with heavy equipment	x
P4-00750	3e Cutting firelines with heavy equipment	x
P4-00757	3e Cutting firelines with heavy equipment	x

P4-00758	3e Cutting firelines with heavy equipment	x
P4-00759	3e Cutting firelines with heavy equipment	x
P4-00763	3e Cutting firelines with heavy equipment	x
P4-00764	3e Cutting firelines with heavy equipment	x
P4-00765	3e Cutting firelines with heavy equipment	x
P4-00766	3e Cutting firelines with heavy equipment	x
P4-00767	3e Cutting firelines with heavy equipment	x
P4-00768	3e Cutting firelines with heavy equipment	x
P4-00769	3e Cutting firelines with heavy equipment	x
P4-00770	3e Cutting firelines with heavy equipment	x
P4-00771	3e Cutting firelines with heavy equipment	x
P4-00772	3e Cutting firelines with heavy equipment	x
P4-00773	3e Cutting firelines with heavy equipment	x
P4-00774	3e Cutting firelines with heavy equipment	x
P4-00775	3e Cutting firelines with heavy equipment	x
P4-00776	3e Cutting firelines with heavy equipment	x
P4-00777	3e Cutting firelines with heavy equipment	x
P4-00778	3e Cutting firelines with heavy equipment	x
P4-00779	3e Cutting firelines with heavy equipment	x
P4-00780	3e Cutting firelines with heavy equipment	x
P4-00781	3e Cutting firelines with heavy equipment	x
P4-00782	3e Cutting firelines with heavy equipment	x

P4-00783	3e Cutting firelines with heavy equipment	x
P4-00784	3e Cutting firelines with heavy equipment	x
P4-00785	3e Cutting firelines with heavy equipment	x
P4-00786	3e Cutting firelines with heavy equipment	x

~~~~~  
 Erin Kelly  
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 Main: 303-292-4760  
 Fax: 303-292-4755  
 Direct: 303-357-3133



Email: [ekelly@srcinc.com](mailto:ekelly@srcinc.com)

RE: OU3 Phase 4a Sample Status  
 Kyeong Corbin  
 to:  
 Bonita Lavelle  
 09/08/2010 05:55 PM  
 Cc:  
 Robert.R.Marriam, "Brattin, Bill"  
 Please respond to kyeong.corbin  
 Show Details

Please see the table below for the sample status.

"Overloaded" samples are the samples that were dusty so we could not prepare directly.

"Archived" samples are the samples we did not need to evaluate because we had one out of three already selected for direct preparation.

"Prepared directly" samples are the samples that were ok and need to be analyzed.

"Analyzed and reported" samples are the samples already analyzed and the EDD reported.

If you have any further questions, please let me know.

Kyeong  
 Hygeia Lab

**From:** Lavelle.Bonita@epamail.epa.gov [mailto:Lavelle.Bonita@epamail.epa.gov]  
**Sent:** Wednesday, September 08, 2010 3:24 PM  
**To:** kyeong.corbin@atcassociates.com  
**Cc:** Robert.R.Marriam@grace.com  
**Subject:** Fw: OU3 Phase 4a Sample Status

Dear Kyeong,

EPA is preparing a modification to the OU3 Phase IV Sampling and Analysis Plan to incorporate indirect preparation of air samples for TEM analysis. The modification will include a list of specific samples to be prepared using indirect methods.

I asked SRC to develop the list of samples based on information from Hygeia on overloading. The email message below identifies samples for which we don't yet have loading information. Can you please provide?

thank you.

Sincerely,

Bonnie Lavelle  
 Remedial Project Manager  
 Libby Asbestos Superfund Site, OU3  
 EPA Region 8  
 1595 Wynkoop Street  
 8EPR-SR  
 Denver, CO 80202-1129

(303) 312-6579  
 Fax (303) 312-7151

| SampleID | Scenario                              | Status                |
|----------|---------------------------------------|-----------------------|
| P4-00199 | 2a Residential wood harvester driving | overloaded            |
| P4-00200 | 2a Residential wood harvester driving | analyzed and reported |
| P4-00201 | 2a Residential wood harvester driving | archived              |
| P4-00202 | 2a Residential wood harvester driving | analyzed and reported |
| P4-00203 | 2a Residential wood harvester driving | archived              |
| P4-00204 | 2a Residential wood harvester driving | archived              |
| P4-00217 | 3a USFS worker trail maintenance      | overloaded            |
| P4-00218 | 3a USFS worker trail maintenance      | overloaded            |
| P4-00219 | 3a USFS worker trail maintenance      | analyzed and reported |
| P4-00223 | 3b USFS worker thinning trees         | analyzed and reported |

|          |                               |                       |
|----------|-------------------------------|-----------------------|
| P4-00224 | 3b USFS worker thinning trees | archived              |
| P4-00225 | 3b USFS worker thinning trees | archived              |
| P4-00416 | 2b.1 Felling and limbing      | overloaded            |
| P4-00417 | 2b.1 Felling and limbing      | overloaded            |
| P4-00418 | 2b.1 Felling and limbing      | overloaded            |
| P4-00419 | 2b.1 Felling and limbing      | overloaded            |
| P4-00420 | 2b.1 Felling and limbing      | overloaded            |
| P4-00421 | 2b.1 Felling and limbing      | overloaded            |
| P4-00434 | 3b USFS worker thinning trees | overloaded            |
| P4-00435 | 3b USFS worker thinning trees | overloaded            |
| P4-00436 | 3b USFS worker thinning trees | overloaded            |
| P4-00446 | 3d Cutting firelines by hand  | overloaded            |
| P4-00447 | 3d Cutting firelines by hand  | overloaded            |
| P4-00448 | 3d Cutting firelines by hand  | overloaded            |
| P4-00454 | 3d Cutting firelines by hand  | overloaded            |
| P4-00455 | 3d Cutting firelines by hand  | overloaded            |
| P4-00456 | 3d Cutting firelines by hand  | overloaded            |
| P4-00460 | 3d Cutting firelines by hand  | overloaded            |
| P4-00461 | 3d Cutting firelines by hand  | overloaded            |
| P4-00462 | 3d Cutting firelines by hand  | overloaded            |
| P4-00466 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00467 | 3d Cutting firelines by hand  | archived              |
| P4-00468 | 3d Cutting firelines by hand  | archived              |
| P4-00469 | 3d Cutting firelines by hand  | archived              |
| P4-00470 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00471 | 3d Cutting firelines by hand  | archived              |
| P4-00481 | 3d Cutting firelines by hand  | overloaded            |
| P4-00482 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00483 | 3d Cutting firelines by hand  | archived              |
| P4-00490 | 3d Cutting firelines by hand  | overloaded            |
| P4-00491 | 3d Cutting firelines by hand  | overloaded            |
| P4-00492 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00493 | 3d Cutting firelines by hand  | overloaded            |
| P4-00494 | 3d Cutting firelines by hand  | overloaded            |
| P4-00495 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00496 | 3d Cutting firelines by hand  | overloaded            |
| P4-00497 | 3d Cutting firelines by hand  | overloaded            |
| P4-00498 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00499 | 3d Cutting firelines by hand  | overloaded            |
| P4-00500 | 3d Cutting firelines by hand  | overloaded            |
| P4-00501 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00502 | 3d Cutting firelines by hand  | overloaded            |
| P4-00503 | 3d Cutting firelines by hand  | overloaded            |
| P4-00504 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00505 | 3d Cutting firelines by hand  | overloaded            |
| P4-00506 | 3d Cutting firelines by hand  | overloaded            |
| P4-00507 | 3d Cutting firelines by hand  | analyzed and reported |
| P4-00542 | 3d Cutting firelines by hand  | overloaded            |

|          |                                  |                       |
|----------|----------------------------------|-----------------------|
| P4-00543 | 3d Cutting firelines by hand     | overloaded            |
| P4-00544 | 3d Cutting firelines by hand     | analyzed and reported |
| P4-00554 | 3d Cutting firelines by hand     | overloaded            |
| P4-00555 | 3d Cutting firelines by hand     | overloaded            |
| P4-00556 | 3d Cutting firelines by hand     | analyzed and reported |
| P4-00569 | 3d Cutting firelines by hand     | overloaded            |
| P4-00570 | 3d Cutting firelines by hand     | overloaded            |
| P4-00571 | 3d Cutting firelines by hand     | analyzed and reported |
| P4-00572 | 3d Cutting firelines by hand     | overloaded            |
| P4-00573 | 3d Cutting firelines by hand     | overloaded            |
| P4-00574 | 3d Cutting firelines by hand     | prepared directly     |
| P4-00587 | 3d Cutting firelines by hand     | overloaded            |
| P4-00588 | 3d Cutting firelines by hand     | overloaded            |
| P4-00589 | 3d Cutting firelines by hand     | prepared directly     |
| P4-00604 | 2b.1 Felling and limbing         | overloaded            |
| P4-00605 | 2b.2 Cutting and stacking        | overloaded            |
| P4-00606 | 2b.2 Cutting and stacking        | prepared directly     |
| P4-00607 | 2b.2 Cutting and stacking        | archived              |
| P4-00608 | 2b.2 Cutting and stacking        | overloaded            |
| P4-00609 | 2b.2 Cutting and stacking        | overloaded            |
| P4-00610 | 2b.2 Cutting and stacking        | prepared directly     |
| P4-00617 | 3a USFS worker trail maintenance | overloaded            |
| P4-00618 | 3a USFS worker trail maintenance | overloaded            |
| P4-00619 | 3a USFS worker trail maintenance | prepared directly     |
| P4-00620 | 3a USFS worker trail maintenance | overloaded            |
| P4-00621 | 3a USFS worker trail maintenance | prepared directly     |
| P4-00622 | 3a USFS worker trail maintenance | archived              |
| P4-00629 | 3c USFS worker stand exam        | overloaded            |
| P4-00630 | 3c USFS worker stand exam        | prepared directly     |
| P4-00631 | 3c USFS worker stand exam        | archived              |
| P4-00632 | 3c USFS worker stand exam        | prepared directly     |
| P4-00633 | 3c USFS worker stand exam        | archived              |
| P4-00634 | 3c USFS worker stand exam        | archived              |
| P4-00635 | 3d Cutting firelines by hand     | overloaded            |
| P4-00636 | 3d Cutting firelines by hand     | overloaded            |
| P4-00637 | 3d Cutting firelines by hand     | prepared directly     |
| P4-00638 | 3d Cutting firelines by hand     | overloaded            |
| P4-00639 | 3d Cutting firelines by hand     | prepared directly     |
| P4-00640 | 3d Cutting firelines by hand     | archived              |
| P4-00641 | 3a USFS worker trail maintenance | overloaded            |
| P4-00642 | 3a USFS worker trail maintenance | overloaded            |
| P4-00643 | 3a USFS worker trail maintenance | prepared directly     |
| P4-00647 | 3b USFS worker thinning trees    | overloaded            |
| P4-00648 | 3b USFS worker thinning trees    | prepared directly     |
| P4-00649 | 3b USFS worker thinning trees    | archived              |
| P4-00650 | 3b USFS worker thinning trees    | overloaded            |
| P4-00651 | 3b USFS worker thinning trees    | overloaded            |
| P4-00652 | 3b USFS worker thinning trees    | prepared directly     |



|          |                                           |                   |
|----------|-------------------------------------------|-------------------|
| P4-00653 | 3c USFS worker stand exam                 | overloaded        |
| P4-00654 | 3c USFS worker stand exam                 | prepared directly |
| P4-00655 | 3c USFS worker stand exam                 | archived          |
| P4-00656 | 3c USFS worker stand exam                 | overloaded        |
| P4-00657 | 3c USFS worker stand exam                 | prepared directly |
| P4-00658 | 3c USFS worker stand exam                 | archived          |
| P4-00659 | 3d Cutting firelines by hand              | prepared directly |
| P4-00660 | 3d Cutting firelines by hand              | archived          |
| P4-00661 | 3d Cutting firelines by hand              | archived          |
| P4-00662 | 3d Cutting firelines by hand              | overloaded        |
| P4-00663 | 3d Cutting firelines by hand              | prepared directly |
| P4-00664 | 3d Cutting firelines by hand              | archived          |
| P4-00668 | 1 Recreational visitor hiking             | overloaded        |
| P4-00669 | 1 Recreational visitor hiking             | overloaded        |
| P4-00670 | 1 Recreational visitor hiking             | prepared directly |
| P4-00701 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00702 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00703 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00732 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00733 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00734 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00735 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00736 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00737 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00748 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00749 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00750 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00757 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00758 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00759 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00763 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00764 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00765 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00766 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00767 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00768 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00769 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00770 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00771 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00772 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00773 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00774 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00775 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00776 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00777 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00778 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00779 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00780 | 3e Cutting firelines with heavy equipment | prepared directly |

|          |                                           |                   |
|----------|-------------------------------------------|-------------------|
| P4-00781 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00782 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00783 | 3e Cutting firelines with heavy equipment | prepared directly |
| P4-00784 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00785 | 3e Cutting firelines with heavy equipment | overloaded        |
| P4-00786 | 3e Cutting firelines with heavy equipment | overloaded        |

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Erin Kelly  
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RE: modification to incorporate indirect prep  
Medler, Robert J. to: Bonita Lavelle, Marriam, Robert R.  
Cc: "Gardner, Lynne G."

09/10/2010 05:28 PM

From: "Medler, Robert J." <Robert.J.Medler@grace.com>  
To: Bonita Lavelle/R8/USEPA/US@EPA, "Marriam, Robert R." <Robert.R.Marriam@grace.com>  
Cc: "Gardner, Lynne G." <Lynne.G.Gardner@grace.com>

1 attachment



OU3\_Phase 4A\_Field Mod 3 rev 1.doc

Bonnie

We have no comments on this.

Bob

-----Original Message-----

From: Lavelle.Bonita@epamail.epa.gov  
[mailto:Lavelle.Bonita@epamail.epa.gov]  
Sent: Thursday, September 09, 2010 5:33 PM  
To: Marriam, Robert R.; Medler, Robert J.  
Subject: modification to incorporate indirect prep

Dear Bob and Bob,

Attached is the text of the modification to incorporate indirect prep methods in the Phase IVA SAP.

The actual mod will include the SOP as well as a list of specific samples to be prepared indirectly.

(See attached file: OU3\_Phase 4A\_Field Mod 3 rev 1.doc)

Let me know if you have comments - I have not signed off yet. I'd like to get this to Hygeia by Monday so they can begin to work on the samples.

Sincerely,

Bonnie Lavelle  
Remedial Project Manager  
Libby Asbestos Superfund Site, OU3  
EPA Region 8  
1595 Wynkoop Street  
8EPR-SR  
Denver, CO 80202-1129

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Fax (303) 312-7151

# FIELD MODIFICATION APPROVAL FORM

LFM-OU3-03

## *Libby OU3 Phase 4A Sampling & Analysis Plan*

Requested by: Erin Kelly

Date: 9/9/10

**Description of Deviation:** This field modification incorporates Indirect Preparation of Selected Samples. Two sections of the Phase IVA SAP are modified.

**Implications:** The indirect preparation procedure may cause a change in the measured concentration due to changes in the size distribution and matrix association of asbestos particles in the sample. The Phase IVA data are expected to be used in the baseline risk assessment for OU3. The potential impact on the measured concentration of samples prepared using indirect methods will be discussed in the uncertainty analysis of the OU3 baseline risk assessment. Additionally, if the calculated risks are close to a decision threshold, EPA may undertake additional analyses to support a correction factor to be applied to the data for use in risk assessment and management decisions.

### **Section 6.2 Analytical Methods and Counting Rules is modified as follows:**

In the event that all three filters collected from the same individual at the same place and time are determined to be overloaded (for the purposes of the Libby Superfund Site, air samples are defined as overloaded if there is >25% obscuration of the majority of the grid openings), one sample will be prepared for analysis using an indirect preparation method. The selection process for the three filters will be as follows:

The high volume sample is preferred over the medium volume and low volume samples. If the high volume sample is damaged or unevenly loaded, the medium volume sample will be selected. In the event that the medium volume sample is also damaged or unevenly loaded, the low volume sample will be selected. In the event that the low volume is damaged or the loading is uneven, no analysis will be performed.

Preparation of the selected sample will follow the indirect preparation method specified in the Libby-specific standard operating procedure EPA-LIBBY-08 (see Attachment 1). Because the air samples collected are considered to be investigative (i.e. collected to characterize concentration values in air for use in risk assessment and risk management decision making), they should be ashed and analyzed as specified in section 4.1 of the SOP (Procedure 1 – Indirect Preparation with Ashing). Table 1 summarizes samples that have been selected for indirect preparation and identifies high priority samples. Table 2 summarizes information on overloading status in the event that a sample in Table 1 is not able to be analyzed.

### **Section 8.2.2 Documentation and Records is modified as follows:**

Data reports submitted by the laboratory for samples that were prepared using indirect preparation methods will include the following language from ASTM D-5755, section 1.4.1 and 5.2:

*"The samples were analyzed with a test method that employs an indirect sample preparation technique. That technique is intended to disperse aggregated asbestos into fundamental fibrils, fiber bundles, clusters, or matrices that can be more accurately quantified by transmission electron microscopy. However, as with all indirect sample preparation techniques, the asbestos observed for quantification may not represent the physical form of the asbestos as sampled. More specifically, the procedure described neither creates nor destroys asbestos, but it may alter the physical form of the mineral fibers. Thus, a single, large asbestos containing particle (from the large end of the particle size distribution)*



*dispersed during sample preparation may result in anomalously large asbestos surface loading results in the TEM analyses of that sample."*

☐ EPA Region 8 has reviewed this field modification approves as proposed.

☐ EPA Region 8 has reviewed this field modification and approves with the following exceptions:

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☐ EPA Region 8 has reviewed this field modification and does not agree with the proposed approach for the following reasons:

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Bonita Lavelle, EPA RPM

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Date

ATTACHMENT 1

EPA-LIBBY-08

## FIELD MODIFICATION APPROVAL FORM

LFM-OU3-03

*Libby OU3 Phase 4A Sampling & Analysis Plan*

Requested by: Erin Kelly

Date: 9/9/10

**Description of Deviation:** This field modification incorporates Indirect Preparation of Selected Samples. Two sections of the Phase IVA SAP are modified.

**Implications:** The indirect preparation procedure may cause a change in the measured concentration due to changes in the size distribution and matrix association of asbestos particles in the sample. The Phase IVA data are expected to be used in the baseline risk assessment for OU3. The potential impact on the measured concentration of samples prepared using indirect methods will be discussed in the uncertainty analysis of the OU3 baseline risk assessment. Additionally, if the calculated risks are close to a decision threshold, EPA may undertake additional analyses to support a correction factor to be applied to the data for use in risk assessment and management decisions.

### **Section 6.2 Analytical Methods and Counting Rules is modified as follows:**

In the event that all three filters collected from the same individual at the same place and time are determined to be overloaded (for the purposes of the Libby Superfund Site, air samples are defined as overloaded if there is >25% obscuration of the majority of the grid openings), one sample will be prepared for analysis using an indirect preparation method. The selection process for the three filters will be as follows:

The high volume sample is preferred over the medium volume and low volume samples. If the high volume sample is damaged or unevenly loaded, the medium volume sample will be selected. In the event that the medium volume sample is also damaged or unevenly loaded, the low volume sample will be selected. In the event that the low volume is damaged or the loading is uneven, no analysis will be performed.

Preparation of the selected sample will follow the indirect preparation method specified in the Libby-specific standard operating procedure EPA-LIBBY-08 (see Attachment 1). Because the air samples collected are considered to be investigative (i.e. collected to characterize concentration values in air for use in risk assessment and risk management decision making), they should be ashed and analyzed as specified in section 4.1 of the SOP (Procedure 1 – Indirect Preparation with Ashing). Table 1 summarizes samples that have been selected for indirect preparation and identifies high priority samples. Table 2 summarizes information on overloading status in the event that a sample in Table 1 is not able to be analyzed.

### **Section 8.2.2 Documentation and Records is modified as follows:**

Data reports submitted by the laboratory for samples that were prepared using indirect preparation methods will include the following language from ASTM D-5755, section 1.4.1 and 5.2:

*"The samples were analyzed with a test method that employs an indirect sample preparation technique. That technique is intended to disperse aggregated asbestos into fundamental fibrils, fiber bundles, clusters, or matrices that can be more accurately quantified by transmission electron microscopy. However, as with all indirect sample preparation techniques, the asbestos observed for quantification may not represent the physical form of the asbestos as sampled. More specifically, the procedure described neither creates nor destroys asbestos, but it may alter the physical form of the mineral fibers. Thus, a single, large asbestos containing particle (from the large end of the particle size distribution)*

*dispersed during sample preparation may result in anomalously large asbestos surface loading results in the TEM analyses of that sample."*

☒ EPA Region 8 has reviewed this field modification and approves as proposed.

☐ EPA Region 8 has reviewed this field modification and approves with the following exceptions:

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☐ EPA Region 8 has reviewed this field modification and does not agree with the proposed approach for the following reasons:

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Bonita Lavelle, EPA RPM

9/13/10  
Date

**Table 1. Phase 4A ABS Samples Selected for Indirect Preparation**

| SampleID | Sample Date | Location | Scenario                                  | Individual | Flow Rate (lpm) | High Priority |
|----------|-------------|----------|-------------------------------------------|------------|-----------------|---------------|
| P4-00036 | 20-Jul-10   | ABS-02   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00151 | 27-Jul-10   | ABS-02   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00154 | 27-Jul-10   | ABS-02   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00319 | 04-Aug-10   | ABS-02   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00322 | 04-Aug-10   | ABS-02   | 3d Cutting firelines by hand              | 2          | 4.05            | Y             |
| P4-00362 | 05-Aug-10   | ABS-07   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00365 | 05-Aug-10   | ABS-07   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00446 | 10-Aug-10   | ABS-02   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00508 | 11-Aug-10   | ABS-07   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00511 | 11-Aug-10   | ABS-07   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00545 | 11-Aug-10   | ABS-10   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00548 | 11-Aug-10   | ABS-10   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00593 | 12-Aug-10   | ABS-02   | 3d Cutting firelines by hand              | 1          | 4               | Y             |
| P4-00596 | 12-Aug-10   | ABS-02   | 3d Cutting firelines by hand              | 2          | 4               | Y             |
| P4-00671 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00674 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00677 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00680 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4.05            | Y             |
| P4-00683 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00686 | 18-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00695 | 19-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00698 | 19-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00704 | 19-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00708 | 19-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00711 | 19-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00720 | 20-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00723 | 20-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 3.95            | Y             |
| P4-00726 | 24-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00729 | 24-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            | Y             |
| P4-00739 | 24-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               | Y             |
| P4-00742 | 24-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            | Y             |
| P4-00751 | 25-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4.05            | Y             |
| P4-00754 | 25-Aug-10   | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            | Y             |
| P4-00760 | 25-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00766 | 25-Aug-10   | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00784 | 26-Aug-10   | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               | Y             |
| P4-00047 | 21-Jul-10   | ABS-07   | 2b Residential wood harvester cutting     | 1          | 4               |               |
| P4-00050 | 21-Jul-10   | ABS-07   | 2b Residential wood harvester cutting     | 2          | 4               |               |
| P4-00059 | 21-Jul-10   | ABS-07   | 3b USFS worker thinning trees             | 1          | 4               |               |
| P4-00083 | 22-Jul-10   | ABS-10   | 2b Residential wood harvester cutting     | 1          | 4               |               |
| P4-00086 | 22-Jul-10   | ABS-10   | 2b Residential wood harvester cutting     | 2          | 4               |               |
| P4-00092 | 22-Jul-10   | ABS-10   | 3a USFS worker trail maintenance          | 2          | 4               |               |
| P4-00099 | 22-Jul-10   | ABS-10   | 3b USFS worker thinning trees             | 2          | 4.05            |               |
| P4-00120 | 27-Jul-10   | ABS-02   | 2b.1 Felling and limbing                  | 1          | 4               |               |
| P4-00123 | 27-Jul-10   | ABS-02   | 2b.1 Felling and limbing                  | 2          | 4               |               |



Table 1. Phase 4A ABS Samples Selected for Indirect Preparation

| SampleID | Sample Date | Location | Scenario                         | Individual | Flow Rate (lpm) | High Priority |
|----------|-------------|----------|----------------------------------|------------|-----------------|---------------|
| P4-00126 | 27-Jul-10   | ABS-02   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00129 | 27-Jul-10   | ABS-02   | 2b.2 Cutting and stacking        | 2          | 4               |               |
| P4-00132 | 27-Jul-10   | ABS-02   | 3a USFS worker trail maintenance | 1          | 4               |               |
| P4-00144 | 27-Jul-10   | ABS-02   | 3c USFS worker stand exam        | 1          | 4               |               |
| P4-00163 | 28-Jul-10   | ABS-07   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00187 | 30-Jul-10   | ABS-10   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00205 | 03-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 1          | 4.05            |               |
| P4-00208 | 03-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 2          | 4.05            |               |
| P4-00211 | 03-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00214 | 03-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 2          | 4               |               |
| P4-00220 | 03-Aug-10   | ABS-07   | 3a USFS worker trail maintenance | 2          | 4               |               |
| P4-00226 | 03-Aug-10   | ABS-07   | 3b USFS worker thinning trees    | 2          | 4               |               |
| P4-00229 | 03-Aug-10   | ABS-07   | 3c USFS worker stand exam        | 1          | 4               |               |
| P4-00232 | 03-Aug-10   | ABS-07   | 3c USFS worker stand exam        | 2          | 4               |               |
| P4-00247 | 03-Aug-10   | ABS-10   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00250 | 03-Aug-10   | ABS-10   | 2b.1 Felling and limbing         | 2          | 4               |               |
| P4-00253 | 03-Aug-10   | ABS-10   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00256 | 03-Aug-10   | ABS-10   | 2b.2 Cutting and stacking        | 2          | 4               |               |
| P4-00265 | 03-Aug-10   | ABS-10   | 3b USFS worker thinning trees    | 1          | 4               |               |
| P4-00268 | 03-Aug-10   | ABS-10   | 3b USFS worker thinning trees    | 2          | 3.95            |               |
| P4-00289 | 04-Aug-10   | ABS-02   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00292 | 04-Aug-10   | ABS-02   | 2b.1 Felling and limbing         | 2          | 4               |               |
| P4-00295 | 04-Aug-10   | ABS-02   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00298 | 04-Aug-10   | ABS-02   | 2b.2 Cutting and stacking        | 2          | 4               |               |
| P4-00310 | 04-Aug-10   | ABS-02   | 3b USFS worker thinning trees    | 2          | 4               |               |
| P4-00313 | 04-Aug-10   | ABS-02   | 3c USFS worker stand exam        | 1          | 4               |               |
| P4-00332 | 05-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 1          | 4.05            |               |
| P4-00335 | 05-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 2          | 4.05            |               |
| P4-00338 | 05-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 1          | 4.05            |               |
| P4-00341 | 05-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 2          | 3.95            |               |
| P4-00344 | 05-Aug-10   | ABS-07   | 3a USFS worker trail maintenance | 1          | 4               |               |
| P4-00350 | 05-Aug-10   | ABS-07   | 3b USFS worker thinning trees    | 1          | 4               |               |
| P4-00353 | 05-Aug-10   | ABS-07   | 3b USFS worker thinning trees    | 2          | 4               |               |
| P4-00374 | 05-Aug-10   | ABS-10   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00377 | 05-Aug-10   | ABS-10   | 2b.1 Felling and limbing         | 2          | 4               |               |
| P4-00383 | 05-Aug-10   | ABS-10   | 2b.2 Cutting and stacking        | 2          | 4               |               |
| P4-00416 | 10-Aug-10   | ABS-02   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00419 | 10-Aug-10   | ABS-02   | 2b.1 Felling and limbing         | 2          | 4               |               |
| P4-00434 | 10-Aug-10   | ABS-02   | 3b USFS worker thinning trees    | 1          | 4               |               |
| P4-00454 | 10-Aug-10   | ABS-02   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00460 | 10-Aug-10   | ABS-02   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00472 | 11-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00475 | 11-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 2          | 4               |               |
| P4-00478 | 11-Aug-10   | ABS-07   | 2b.1 Felling and limbing         | 1          | 4               |               |
| P4-00484 | 11-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 1          | 4               |               |
| P4-00487 | 11-Aug-10   | ABS-07   | 2b.2 Cutting and stacking        | 2          | 4               |               |

**Table 1. Phase 4A ABS Samples Selected for Indirect Preparation**

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | High Priority |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------|
| P4-00515 | 11-Aug-10   | ABS-10   | 2a Residential wood harvester driving | 1          | 4               |               |
| P4-00518 | 11-Aug-10   | ABS-10   | 2a Residential wood harvester driving | 2          | 4               |               |
| P4-00521 | 11-Aug-10   | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |               |
| P4-00524 | 11-Aug-10   | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |               |
| P4-00527 | 11-Aug-10   | ABS-10   | 3a USFS worker trail maintenance      | 1          | 4               |               |
| P4-00530 | 11-Aug-10   | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4               |               |
| P4-00533 | 11-Aug-10   | ABS-10   | 3b USFS worker thinning trees         | 1          | 4               |               |
| P4-00536 | 11-Aug-10   | ABS-10   | 3b USFS worker thinning trees         | 2          | 4               |               |
| P4-00539 | 11-Aug-10   | ABS-10   | 3c USFS worker stand exam             | 1          | 4               |               |
| P4-00551 | 12-Aug-10   | ABS-02   | 2a Residential wood harvester driving | 1          | 4               |               |
| P4-00557 | 12-Aug-10   | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |               |
| P4-00560 | 12-Aug-10   | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |               |
| P4-00563 | 12-Aug-10   | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |               |
| P4-00566 | 12-Aug-10   | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |               |
| P4-00575 | 12-Aug-10   | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |               |
| P4-00578 | 12-Aug-10   | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4               |               |
| P4-00581 | 12-Aug-10   | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |               |
| P4-00584 | 12-Aug-10   | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |               |
| P4-00590 | 12-Aug-10   | ABS-02   | 3c USFS worker stand exam             | 2          | 4               |               |
| P4-00599 | 12-Aug-10   | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |               |
| P4-00602 | 12-Aug-10   | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |               |
| P4-00623 | 17-Aug-10   | ABS-10   | 3b USFS worker thinning trees         | 1          | 4               |               |
| P4-00626 | 17-Aug-10   | ABS-10   | 3b USFS worker thinning trees         | 2          | 4               |               |
| P4-00644 | 17-Aug-10   | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4.05            |               |
| P4-00665 | 17-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 1          | 4               |               |
| P4-00689 | 19-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 1          | 4               |               |
| P4-00692 | 19-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 2          | 4               |               |
| P4-00714 | 20-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 1          | 4               |               |
| P4-00717 | 20-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 2          | 4               |               |
| P4-00745 | 25-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 1          | 3.95            |               |
| P4-00769 | 26-Aug-10   | RAINY    | 1 Recreational visitor hiking         | 1          | 4               |               |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00003 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00004 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00005 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00006 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00007 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00008 | 7/20/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00009 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 1          | 4               |                           |                  |                                  |
| P4-00010 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 1          | 2.05            |                           |                  |                                  |
| P4-00011 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 1          | 1               | Y                         |                  |                                  |
| P4-00012 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 2          | 4               |                           |                  |                                  |
| P4-00013 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 2          | 2.05            |                           |                  |                                  |
| P4-00014 | 7/20/10     | ABS-02   | 2b Residential wood harvester cutting | 2          | 1               | Y                         |                  |                                  |
| P4-00015 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |                           |                  |                                  |
| P4-00016 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 2               |                           |                  |                                  |
| P4-00017 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00018 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00019 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 2.05            |                           |                  |                                  |
| P4-00020 | 7/20/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00021 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |                           |                  |                                  |
| P4-00022 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 2               | Y                         |                  |                                  |
| P4-00023 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 1               |                           |                  |                                  |
| P4-00024 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |                           |                  |                                  |
| P4-00025 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 2               |                           |                  |                                  |
| P4-00026 | 7/20/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 1               | Y                         |                  |                                  |
| P4-00027 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 4               | Y                         |                  |                                  |
| P4-00028 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 1               |                           |                  |                                  |
| P4-00029 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 2               |                           |                  |                                  |
| P4-00030 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 4               | Y                         |                  |                                  |
| P4-00031 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 2               |                           |                  |                                  |
| P4-00032 | 7/20/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 1               |                           |                  |                                  |
| P4-00033 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 4               |                           |                  |                                  |
| P4-00034 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 2               |                           |                  |                                  |
| P4-00035 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 1               | Y                         |                  |                                  |
| P4-00036 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00037 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00038 | 7/20/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00041 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 4               |                           |                  |                                  |
| P4-00042 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00043 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 1               | Y                         |                  |                                  |
| P4-00044 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00045 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00046 | 7/21/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00047 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 1          | 4               |                           | Y                | Y                                |
| P4-00048 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 1          | 2               |                           | Y                |                                  |
| P4-00049 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 1          | 1               |                           | Y                |                                  |
| P4-00050 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 2          | 4               |                           | Y                | Y                                |
| P4-00051 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 2          | 2.05            |                           | Y                |                                  |
| P4-00052 | 7/21/10     | ABS-07   | 2b Residential wood harvester cutting | 2          | 1               |                           | Y                |                                  |
| P4-00053 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 4               |                           |                  |                                  |
| P4-00054 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 2               | Y                         |                  |                                  |
| P4-00055 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 1               |                           |                  |                                  |
| P4-00056 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00057 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 2               |                           |                  |                                  |
| P4-00058 | 7/21/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00059 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                | Y                                |
| P4-00060 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 2.05            |                           | Y                |                                  |
| P4-00061 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 1               |                           | Y                |                                  |
| P4-00062 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 4               |                           |                  |                                  |
| P4-00063 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 2.05            |                           |                  |                                  |
| P4-00064 | 7/21/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 1               | Y                         |                  |                                  |
| P4-00065 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 4               |                           |                  |                                  |
| P4-00066 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 2               | Y                         |                  |                                  |
| P4-00067 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 1               |                           |                  |                                  |
| P4-00068 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 4               | Y                         |                  |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00069 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 2               |                           |                  |                                  |
| P4-00070 | 7/21/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 1               |                           |                  |                                  |
| P4-00071 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 4.05            |                           |                  |                                  |
| P4-00072 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 2               | Y                         |                  |                                  |
| P4-00073 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 1               |                           |                  |                                  |
| P4-00074 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 4.05            |                           |                  |                                  |
| P4-00075 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 2               |                           |                  |                                  |
| P4-00076 | 7/21/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 1               | Y                         |                  |                                  |
| P4-00077 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00078 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00079 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00080 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00081 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00082 | 7/22/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00083 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 1          | 4               |                           | Y                | Y                                |
| P4-00084 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 1          | 2               |                           | Y                |                                  |
| P4-00085 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 1          | 1               |                           | Y                |                                  |
| P4-00086 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 2          | 4               |                           | Y                | Y                                |
| P4-00087 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 2          | 2               |                           | Y                |                                  |
| P4-00088 | 7/22/10     | ABS-10   | 2b Residential wood harvester cutting | 2          | 1               |                           | Y                |                                  |
| P4-00089 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 4               |                           |                  |                                  |
| P4-00090 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 2               |                           |                  |                                  |
| P4-00091 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00092 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4               |                           | Y                | Y                                |
| P4-00093 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 2               |                           | Y                |                                  |
| P4-00094 | 7/22/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 1               |                           | Y                |                                  |
| P4-00096 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 4.05            |                           |                  |                                  |
| P4-00097 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 2.05            |                           |                  |                                  |
| P4-00098 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 1               | Y                         |                  |                                  |
| P4-00099 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 4.05            |                           | Y                | Y                                |
| P4-00100 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00101 | 7/22/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 1.05            |                           | Y                |                                  |
| P4-00102 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 4               |                           |                  |                                  |
| P4-00103 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 2               |                           |                  |                                  |
| P4-00104 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 1               | Y                         |                  |                                  |
| P4-00105 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 4               |                           |                  |                                  |
| P4-00106 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 2               | Y                         |                  |                                  |
| P4-00107 | 7/22/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 1               |                           |                  |                                  |
| P4-00108 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 4               |                           |                  |                                  |
| P4-00109 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 2               |                           |                  |                                  |
| P4-00110 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 1               | Y                         |                  |                                  |
| P4-00111 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 4               |                           |                  |                                  |
| P4-00112 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 2               | Y                         |                  |                                  |
| P4-00113 | 7/22/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 1               |                           |                  |                                  |
| P4-00114 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00115 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00116 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00117 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00118 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00119 | 7/27/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00120 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00121 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00122 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00123 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00124 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00125 | 7/27/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00126 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                | Y                                |
| P4-00127 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00128 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00129 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00130 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 2.05            |                           | Y                |                                  |
| P4-00131 | 7/27/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 1.05            |                           | Y                |                                  |
| P4-00132 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                | Y                                |
| P4-00133 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |



Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00134 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 1               |                           | Y                |                                  |
| P4-00135 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00136 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 2               | Y                         |                  |                                  |
| P4-00137 | 7/27/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 1               |                           |                  |                                  |
| P4-00138 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |                           |                  |                                  |
| P4-00139 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 2               |                           |                  |                                  |
| P4-00140 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 1               | Y                         |                  |                                  |
| P4-00141 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |                           |                  |                                  |
| P4-00142 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 2               |                           |                  |                                  |
| P4-00143 | 7/27/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 1               | Y                         |                  |                                  |
| P4-00144 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                | Y                                |
| P4-00145 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00146 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 1               |                           | Y                |                                  |
| P4-00147 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 4               |                           |                  |                                  |
| P4-00148 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 2               |                           |                  |                                  |
| P4-00149 | 7/27/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 1               | Y                         |                  |                                  |
| P4-00151 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00152 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00153 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00154 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00155 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00156 | 7/27/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00157 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00158 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00159 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00160 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00161 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00162 | 7/28/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00163 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00164 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00165 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00166 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 4               |                           |                  |                                  |
| P4-00167 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 2               |                           |                  |                                  |
| P4-00168 | 7/28/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 1               | Y                         |                  |                                  |
| P4-00169 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 4               |                           |                  |                                  |
| P4-00170 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 2               |                           |                  |                                  |
| P4-00171 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 1               | Y                         |                  |                                  |
| P4-00172 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 4               |                           |                  |                                  |
| P4-00173 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 2               | Y                         |                  |                                  |
| P4-00174 | 7/28/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 1               |                           |                  |                                  |
| P4-00181 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00182 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00183 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00184 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00185 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00186 | 7/30/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00187 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00188 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00189 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00190 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |                           |                  |                                  |
| P4-00191 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 2               |                           |                  |                                  |
| P4-00192 | 7/30/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 1               | Y                         |                  |                                  |
| P4-00193 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 1          | 4               |                           |                  |                                  |
| P4-00194 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 1          | 2               |                           |                  |                                  |
| P4-00195 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 1          | 1               | Y                         |                  |                                  |
| P4-00196 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 2          | 4               |                           |                  |                                  |
| P4-00197 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 2          | 2               |                           |                  |                                  |
| P4-00198 | 7/30/10     | ABS-10   | 2b.2 Cutting and stacking             | 2          | 1               | Y                         |                  |                                  |
| P4-00199 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 4               |                           |                  |                                  |
| P4-00200 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 2               | Y                         |                  |                                  |
| P4-00201 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00202 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00203 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00204 | 8/3/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00205 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 4.05            |                           | Y                | Y                                |
| P4-00206 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00207 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00208 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 4.05            |                           | Y                | Y                                |
| P4-00209 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00210 | 8/3/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00211 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                | Y                                |
| P4-00212 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00213 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00214 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00215 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00216 | 8/3/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00217 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                |                                  |
| P4-00218 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |
| P4-00219 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00220 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 4               |                           | Y                | Y                                |
| P4-00221 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 2               |                           | Y                |                                  |
| P4-00222 | 8/3/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 1               |                           | Y                |                                  |
| P4-00223 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 4               | Y                         |                  |                                  |
| P4-00224 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 2               |                           |                  |                                  |
| P4-00225 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 1               |                           |                  |                                  |
| P4-00226 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                | Y                                |
| P4-00227 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00228 | 8/3/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00229 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                | Y                                |
| P4-00230 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00231 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 1               |                           | Y                |                                  |
| P4-00232 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 4               |                           | Y                | Y                                |
| P4-00233 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 2               |                           | Y                |                                  |
| P4-00234 | 8/3/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 1               |                           | Y                |                                  |
| P4-00235 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 4               |                           |                  |                                  |
| P4-00236 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 2               |                           |                  |                                  |
| P4-00237 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 1               | Y                         |                  |                                  |
| P4-00238 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 4               |                           |                  |                                  |
| P4-00239 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 2               |                           |                  |                                  |
| P4-00240 | 8/3/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 1               | Y                         |                  |                                  |
| P4-00241 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00242 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00243 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00244 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00245 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00246 | 8/3/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00247 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00248 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00249 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00250 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00251 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00252 | 8/3/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00253 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                | Y                                |
| P4-00254 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00255 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00256 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00257 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00258 | 8/3/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00259 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 4               | Y                         |                  |                                  |
| P4-00260 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 2               |                           |                  |                                  |
| P4-00261 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 1               |                           |                  |                                  |
| P4-00262 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00263 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 2               | Y                         |                  |                                  |
| P4-00264 | 8/3/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 1               |                           |                  |                                  |
| P4-00265 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                | Y                                |
| P4-00266 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 2               |                           | Y                |                                  |
| P4-00267 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 1               |                           | Y                |                                  |
| P4-00268 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 3.95            |                           | Y                | Y                                |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00269 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00270 | 8/3/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00271 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 4               |                           |                  |                                  |
| P4-00272 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 2               |                           |                  |                                  |
| P4-00273 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 1               | Y                         |                  |                                  |
| P4-00274 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 4               |                           |                  |                                  |
| P4-00275 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 2               | Y                         |                  |                                  |
| P4-00276 | 8/3/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 1               |                           |                  |                                  |
| P4-00277 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 4               | Y                         |                  |                                  |
| P4-00278 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 2               |                           |                  |                                  |
| P4-00279 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 1               |                           |                  |                                  |
| P4-00280 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 4               | Y                         |                  |                                  |
| P4-00281 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 2               |                           |                  |                                  |
| P4-00282 | 8/3/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 1               |                           |                  |                                  |
| P4-00283 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 1          | 4               | Y                         |                  |                                  |
| P4-00284 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00285 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 1          | 1               |                           |                  |                                  |
| P4-00286 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00287 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00288 | 8/4/10      | ABS-02   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00289 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00290 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00291 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00292 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00293 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00294 | 8/4/10      | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00295 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                | Y                                |
| P4-00296 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00297 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00298 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00299 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00300 | 8/4/10      | ABS-02   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00301 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |                           |                  |                                  |
| P4-00302 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 1          | 2               |                           |                  |                                  |
| P4-00303 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00304 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4.05            |                           |                  |                                  |
| P4-00305 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 2          | 2               |                           |                  |                                  |
| P4-00306 | 8/4/10      | ABS-02   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00307 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |                           |                  |                                  |
| P4-00308 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 1          | 2.05            |                           |                  |                                  |
| P4-00309 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 1          | 1               | Y                         |                  |                                  |
| P4-00310 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                | Y                                |
| P4-00311 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 2          | 2.05            |                           | Y                |                                  |
| P4-00312 | 8/4/10      | ABS-02   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00313 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                | Y                                |
| P4-00314 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00315 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 1          | 1               |                           | Y                |                                  |
| P4-00316 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 2          | 4.05            |                           |                  |                                  |
| P4-00317 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 2          | 2               |                           |                  |                                  |
| P4-00318 | 8/4/10      | ABS-02   | 3c USFS worker stand exam             | 2          | 1               | Y                         |                  |                                  |
| P4-00319 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00320 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00321 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00322 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 2          | 4.05            |                           | Y                | Y                                |
| P4-00323 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00324 | 8/4/10      | ABS-02   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00326 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 4               |                           |                  |                                  |
| P4-00327 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00328 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 1          | 1               | Y                         |                  |                                  |
| P4-00329 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 4               |                           |                  |                                  |
| P4-00330 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 2               | Y                         |                  |                                  |
| P4-00331 | 8/5/10      | ABS-07   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00332 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 4.05            |                           | Y                | Y                                |
| P4-00333 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 2.05            |                           | Y                |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00334 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00335 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 4.05            |                           | Y                | Y                                |
| P4-00336 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 2.05            |                           | Y                |                                  |
| P4-00337 | 8/5/10      | ABS-07   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00338 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 4.05            |                           | Y                | Y                                |
| P4-00339 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00340 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00341 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 3.95            |                           | Y                | Y                                |
| P4-00342 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00343 | 8/5/10      | ABS-07   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00344 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                | Y                                |
| P4-00345 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |
| P4-00346 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 1          | 1               |                           | Y                |                                  |
| P4-00347 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00348 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 2               |                           |                  |                                  |
| P4-00349 | 8/5/10      | ABS-07   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00350 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                | Y                                |
| P4-00351 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 2               |                           | Y                |                                  |
| P4-00352 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 1          | 1               |                           | Y                |                                  |
| P4-00353 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                | Y                                |
| P4-00354 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00355 | 8/5/10      | ABS-07   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00356 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 4               |                           |                  |                                  |
| P4-00357 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 2               |                           |                  |                                  |
| P4-00358 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 1          | 1               | Y                         |                  |                                  |
| P4-00359 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 4               |                           |                  |                                  |
| P4-00360 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 2               |                           |                  |                                  |
| P4-00361 | 8/5/10      | ABS-07   | 3c USFS worker stand exam             | 2          | 1               | Y                         |                  |                                  |
| P4-00362 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00363 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00364 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00365 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00366 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00367 | 8/5/10      | ABS-07   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00368 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 3.95            |                           |                  |                                  |
| P4-00369 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 2               |                           |                  |                                  |
| P4-00370 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 1          | 1               | Y                         |                  |                                  |
| P4-00371 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 4               | Y                         |                  |                                  |
| P4-00372 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 2               |                           |                  |                                  |
| P4-00373 | 8/5/10      | ABS-10   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00374 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00375 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00376 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00377 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00378 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 2.05            |                           | Y                |                                  |
| P4-00379 | 8/5/10      | ABS-10   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00380 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 4               |                           |                  |                                  |
| P4-00381 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 2               |                           |                  |                                  |
| P4-00382 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 1          | 1               | Y                         |                  |                                  |
| P4-00383 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00384 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00385 | 8/5/10      | ABS-10   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00386 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 4               |                           |                  |                                  |
| P4-00387 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 2               |                           |                  |                                  |
| P4-00388 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00389 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4               |                           |                  |                                  |
| P4-00390 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 2               |                           |                  |                                  |
| P4-00391 | 8/5/10      | ABS-10   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00392 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 4               |                           |                  |                                  |
| P4-00393 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 2               |                           |                  |                                  |
| P4-00394 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 1          | 1               | Y                         |                  |                                  |
| P4-00395 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 4               |                           |                  |                                  |
| P4-00396 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 2               |                           |                  |                                  |
| P4-00397 | 8/5/10      | ABS-10   | 3b USFS worker thinning trees         | 2          | 1               | Y                         |                  |                                  |

Table 2. Phase 4A ABS Sample Summary

| Sample ID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete (Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|-----------|-------------|----------|---------------------------------------|------------|-----------------|----------------------------|------------------|----------------------------------|
| P4-00398  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 4               |                            |                  |                                  |
| P4-00399  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 2.05            |                            |                  |                                  |
| P4-00400  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 1          | 1               | Y                          |                  |                                  |
| P4-00401  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 4               |                            |                  |                                  |
| P4-00402  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 2               | Y                          |                  |                                  |
| P4-00403  | 8/5/10      | ABS-10   | 3c USFS worker stand exam             | 2          | 1               |                            |                  |                                  |
| P4-00404  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 4               |                            |                  |                                  |
| P4-00405  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 2               | Y                          |                  |                                  |
| P4-00406  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 1          | 1               |                            |                  |                                  |
| P4-00407  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 4               |                            |                  |                                  |
| P4-00408  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 2               | Y                          |                  |                                  |
| P4-00409  | 8/5/10      | ABS-10   | 3d Cutting firelines by hand          | 2          | 1               |                            |                  |                                  |
| P4-00410  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 4               |                            |                  |                                  |
| P4-00411  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 2               |                            |                  |                                  |
| P4-00412  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 1               | Y                          |                  |                                  |
| P4-00413  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 4               |                            |                  |                                  |
| P4-00414  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 2               |                            |                  |                                  |
| P4-00415  | 8/10/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 1               | Y                          |                  |                                  |
| P4-00416  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                            | Y                | Y                                |
| P4-00417  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                            | Y                |                                  |
| P4-00418  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                            | Y                |                                  |
| P4-00419  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                            | Y                | Y                                |
| P4-00420  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                            | Y                |                                  |
| P4-00421  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               |                            | Y                |                                  |
| P4-00428  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |                            |                  |                                  |
| P4-00429  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 2               |                            |                  |                                  |
| P4-00430  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 1               | Y                          |                  |                                  |
| P4-00431  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4               |                            |                  |                                  |
| P4-00432  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 2               |                            |                  |                                  |
| P4-00433  | 8/10/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 1               | Y                          |                  |                                  |
| P4-00434  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |                            | Y                | Y                                |
| P4-00435  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 2               |                            | Y                |                                  |
| P4-00436  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 1               |                            | Y                |                                  |
| P4-00437  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |                            |                  |                                  |
| P4-00438  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 2               |                            |                  |                                  |
| P4-00439  | 8/10/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 1               | Y                          |                  |                                  |
| P4-00440  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 4               |                            |                  |                                  |
| P4-00441  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 2               |                            |                  |                                  |
| P4-00442  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 1               | Y                          |                  |                                  |
| P4-00443  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 4               |                            |                  |                                  |
| P4-00444  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 2               |                            |                  |                                  |
| P4-00445  | 8/10/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 1               | Y                          |                  |                                  |
| P4-00446  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 4               |                            | Y                | Y                                |
| P4-00447  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 2               |                            | Y                |                                  |
| P4-00448  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 1               |                            | Y                |                                  |
| P4-00449  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 4               |                            |                  |                                  |
| P4-00450  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 2               |                            |                  |                                  |
| P4-00451  | 8/10/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 1               | Y                          |                  |                                  |
| P4-00454  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                            | Y                | Y                                |
| P4-00455  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                            | Y                |                                  |
| P4-00456  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                            | Y                |                                  |
| P4-00457  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                            |                  |                                  |
| P4-00458  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                            |                  |                                  |
| P4-00459  | 8/10/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               | Y                          |                  |                                  |
| P4-00460  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 4               |                            | Y                | Y                                |
| P4-00461  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 2               |                            | Y                |                                  |
| P4-00462  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 1               |                            | Y                |                                  |
| P4-00463  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 4               |                            |                  |                                  |
| P4-00464  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 2               |                            |                  |                                  |
| P4-00465  | 8/10/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 1               | Y                          |                  |                                  |
| P4-00466  | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 4               | Y                          |                  |                                  |
| P4-00467  | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 2               |                            |                  |                                  |
| P4-00468  | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 1          | 1               |                            |                  |                                  |
| P4-00469  | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 4               |                            |                  |                                  |



Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00470 | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 2               | Y                         |                  |                                  |
| P4-00471 | 8/11/10     | ABS-07   | 2a Residential wood harvester driving | 2          | 1               |                           |                  |                                  |
| P4-00472 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00473 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00474 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00475 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00476 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00477 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00478 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00479 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00480 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00481 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                |                                  |
| P4-00482 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 2               | Y                         |                  |                                  |
| P4-00483 | 8/11/10     | ABS-07   | 2b.1 Felling and limbing              | 2          | 1               |                           |                  |                                  |
| P4-00484 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                | Y                                |
| P4-00485 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00486 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 1          | 1               |                           | Y                |                                  |
| P4-00487 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                | Y                                |
| P4-00488 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00489 | 8/11/10     | ABS-07   | 2b.2 Cutting and stacking             | 2          | 1               |                           | Y                |                                  |
| P4-00490 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                |                                  |
| P4-00491 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |
| P4-00492 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 1          | 1               | Y                         |                  |                                  |
| P4-00493 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 4               |                           | Y                |                                  |
| P4-00494 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 2               |                           | Y                |                                  |
| P4-00495 | 8/11/10     | ABS-07   | 3a USFS worker trail maintenance      | 2          | 1               | Y                         |                  |                                  |
| P4-00496 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                |                                  |
| P4-00497 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 2               |                           | Y                |                                  |
| P4-00498 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 1          | 1               | Y                         |                  |                                  |
| P4-00499 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                |                                  |
| P4-00500 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00501 | 8/11/10     | ABS-07   | 3b USFS worker thinning trees         | 2          | 1               | Y                         |                  |                                  |
| P4-00502 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                |                                  |
| P4-00503 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00504 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 1          | 1               | Y                         |                  |                                  |
| P4-00505 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 4               |                           | Y                |                                  |
| P4-00506 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 2               |                           | Y                |                                  |
| P4-00507 | 8/11/10     | ABS-07   | 3c USFS worker stand exam             | 2          | 1               | Y                         |                  |                                  |
| P4-00508 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00509 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00510 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00511 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00512 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00513 | 8/11/10     | ABS-07   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00515 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 4               |                           | Y                | Y                                |
| P4-00516 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 2               |                           | Y                |                                  |
| P4-00517 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 1          | 1               |                           | Y                |                                  |
| P4-00518 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 4               |                           | Y                | Y                                |
| P4-00519 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 2               |                           | Y                |                                  |
| P4-00520 | 8/11/10     | ABS-10   | 2a Residential wood harvester driving | 2          | 1               |                           | Y                |                                  |
| P4-00521 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00522 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00523 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00524 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00525 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00526 | 8/11/10     | ABS-10   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00527 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                | Y                                |
| P4-00528 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |
| P4-00529 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 1          | 1               |                           | Y                |                                  |
| P4-00530 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 4               |                           | Y                | Y                                |
| P4-00531 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 2               |                           | Y                |                                  |
| P4-00532 | 8/11/10     | ABS-10   | 3a USFS worker trail maintenance      | 2          | 1               |                           | Y                |                                  |
| P4-00533 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                | Y                                |
| P4-00534 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 2               |                           | Y                |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                              | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|---------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00535 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 1          | 1               |                           | Y                |                                  |
| P4-00536 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                | Y                                |
| P4-00537 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00538 | 8/11/10     | ABS-10   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00539 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                | Y                                |
| P4-00540 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00541 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 1          | 1               |                           | Y                |                                  |
| P4-00542 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 4               |                           | Y                |                                  |
| P4-00543 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 2               |                           | Y                |                                  |
| P4-00544 | 8/11/10     | ABS-10   | 3c USFS worker stand exam             | 2          | 1               | Y                         |                  |                                  |
| P4-00545 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00546 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00547 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00548 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00549 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00550 | 8/11/10     | ABS-10   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |
| P4-00551 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 4               |                           | Y                | Y                                |
| P4-00552 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 2               |                           | Y                |                                  |
| P4-00553 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 1          | 1               |                           | Y                |                                  |
| P4-00554 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 4               |                           | Y                |                                  |
| P4-00555 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 2               |                           | Y                |                                  |
| P4-00556 | 8/12/10     | ABS-02   | 2a Residential wood harvester driving | 2          | 1               | Y                         |                  |                                  |
| P4-00557 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00558 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00559 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00560 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00561 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00562 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00563 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 4               |                           | Y                | Y                                |
| P4-00564 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 2               |                           | Y                |                                  |
| P4-00565 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 1          | 1               |                           | Y                |                                  |
| P4-00566 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 4               |                           | Y                | Y                                |
| P4-00567 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 2               |                           | Y                |                                  |
| P4-00568 | 8/12/10     | ABS-02   | 2b.1 Felling and limbing              | 2          | 1               |                           | Y                |                                  |
| P4-00569 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 4               |                           | Y                |                                  |
| P4-00570 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 2               |                           | Y                |                                  |
| P4-00571 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 1          | 1               | Y                         |                  |                                  |
| P4-00572 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 4               |                           | Y                |                                  |
| P4-00573 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 2               |                           | Y                |                                  |
| P4-00574 | 8/12/10     | ABS-02   | 2b.2 Cutting and stacking             | 2          | 1               | Y                         |                  |                                  |
| P4-00575 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 4               |                           | Y                | Y                                |
| P4-00576 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 2               |                           | Y                |                                  |
| P4-00577 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 1          | 1               |                           | Y                |                                  |
| P4-00578 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 4               |                           | Y                | Y                                |
| P4-00579 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 2               |                           | Y                |                                  |
| P4-00580 | 8/12/10     | ABS-02   | 3a USFS worker trail maintenance      | 2          | 1               |                           | Y                |                                  |
| P4-00581 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 4               |                           | Y                | Y                                |
| P4-00582 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 2               |                           | Y                |                                  |
| P4-00583 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 1          | 1               |                           | Y                |                                  |
| P4-00584 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 4               |                           | Y                | Y                                |
| P4-00585 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 2               |                           | Y                |                                  |
| P4-00586 | 8/12/10     | ABS-02   | 3b USFS worker thinning trees         | 2          | 1               |                           | Y                |                                  |
| P4-00587 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 4               |                           | Y                |                                  |
| P4-00588 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 2               |                           | Y                |                                  |
| P4-00589 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 1          | 1               | Y                         |                  |                                  |
| P4-00590 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 4               |                           | Y                | Y                                |
| P4-00591 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 2               |                           | Y                |                                  |
| P4-00592 | 8/12/10     | ABS-02   | 3c USFS worker stand exam             | 2          | 1               |                           | Y                |                                  |
| P4-00593 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 4               |                           | Y                | Y                                |
| P4-00594 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 2               |                           | Y                |                                  |
| P4-00595 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 1          | 1               |                           | Y                |                                  |
| P4-00596 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 4               |                           | Y                | Y                                |
| P4-00597 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 2               |                           | Y                |                                  |
| P4-00598 | 8/12/10     | ABS-02   | 3d Cutting firelines by hand          | 2          | 1               |                           | Y                |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                         | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|----------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00599 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 1          | 4               |                           | Y                | Y                                |
| P4-00600 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 1          | 2               |                           | Y                |                                  |
| P4-00601 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 1          | 1               |                           | Y                |                                  |
| P4-00602 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 2          | 4               |                           | Y                | Y                                |
| P4-00603 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 2          | 2               |                           | Y                |                                  |
| P4-00604 | 8/12/10     | ABS-10   | 2b.1 Felling and limbing         | 2          | 1               |                           | Y                |                                  |
| P4-00605 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 1          | 4               |                           | Y                |                                  |
| P4-00606 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 1          | 2               | Y                         |                  |                                  |
| P4-00607 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 1          | 1               |                           |                  |                                  |
| P4-00608 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 2          | 4               |                           | Y                |                                  |
| P4-00609 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 2          | 2               |                           | Y                |                                  |
| P4-00610 | 8/12/10     | ABS-10   | 2b.2 Cutting and stacking        | 2          | 1               | Y                         |                  |                                  |
| P4-00617 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 4               |                           | Y                |                                  |
| P4-00618 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 2               |                           | Y                |                                  |
| P4-00619 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 1               | Y                         |                  |                                  |
| P4-00620 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 3.95            |                           | Y                |                                  |
| P4-00621 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 2               | Y                         |                  |                                  |
| P4-00622 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 1               |                           |                  |                                  |
| P4-00623 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 4               |                           | Y                | Y                                |
| P4-00624 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 2               |                           | Y                |                                  |
| P4-00625 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 1               |                           | Y                |                                  |
| P4-00626 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 4               |                           | Y                | Y                                |
| P4-00627 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 2               |                           | Y                |                                  |
| P4-00628 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 1               |                           | Y                |                                  |
| P4-00629 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 4               |                           | Y                |                                  |
| P4-00630 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 2               | Y                         |                  |                                  |
| P4-00631 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 1               |                           |                  |                                  |
| P4-00632 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 4               | Y                         |                  |                                  |
| P4-00633 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 2               |                           |                  |                                  |
| P4-00634 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 1               |                           |                  |                                  |
| P4-00635 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 4               |                           | Y                |                                  |
| P4-00636 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 2               |                           | Y                |                                  |
| P4-00637 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 1               | Y                         |                  |                                  |
| P4-00638 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 4.05            |                           | Y                |                                  |
| P4-00639 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 2               | Y                         |                  |                                  |
| P4-00640 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 1               |                           |                  |                                  |
| P4-00641 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 4.05            |                           | Y                |                                  |
| P4-00642 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 2.05            |                           | Y                |                                  |
| P4-00643 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 1          | 1               | Y                         |                  |                                  |
| P4-00644 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 4.05            |                           | Y                | Y                                |
| P4-00645 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 2.05            |                           | Y                |                                  |
| P4-00646 | 8/17/10     | ABS-10   | 3a USFS worker trail maintenance | 2          | 1.05            |                           | Y                |                                  |
| P4-00647 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 4               |                           | Y                |                                  |
| P4-00648 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 2               | Y                         |                  |                                  |
| P4-00649 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 1          | 1               |                           |                  |                                  |
| P4-00650 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 3.95            |                           | Y                |                                  |
| P4-00651 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 2               |                           | Y                |                                  |
| P4-00652 | 8/17/10     | ABS-10   | 3b USFS worker thinning trees    | 2          | 1               | Y                         |                  |                                  |
| P4-00653 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 4               |                           | Y                |                                  |
| P4-00654 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 2               | Y                         |                  |                                  |
| P4-00655 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 1          | 1               |                           |                  |                                  |
| P4-00656 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 4               |                           | Y                |                                  |
| P4-00657 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 2               | Y                         |                  |                                  |
| P4-00658 | 8/17/10     | ABS-10   | 3c USFS worker stand exam        | 2          | 1               |                           |                  |                                  |
| P4-00659 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 4               | Y                         |                  |                                  |
| P4-00660 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 2               |                           |                  |                                  |
| P4-00661 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 1          | 1               |                           |                  |                                  |
| P4-00662 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 4               |                           | Y                |                                  |
| P4-00663 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 2               | Y                         |                  |                                  |
| P4-00664 | 8/17/10     | ABS-10   | 3d Cutting firelines by hand     | 2          | 1               |                           |                  |                                  |
| P4-00665 | 8/17/10     | RAINY    | 1 Recreational visitor hiking    | 1          | 4               |                           | Y                | Y                                |
| P4-00666 | 8/17/10     | RAINY    | 1 Recreational visitor hiking    | 1          | 2               |                           | Y                |                                  |
| P4-00667 | 8/17/10     | RAINY    | 1 Recreational visitor hiking    | 1          | 1               |                           | Y                |                                  |
| P4-00668 | 8/17/10     | RAINY    | 1 Recreational visitor hiking    | 2          | 4               |                           | Y                |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                                  | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|-------------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00669 | 8/17/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 2               |                           | Y                |                                  |
| P4-00670 | 8/17/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 1               | Y                         |                  |                                  |
| P4-00671 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00672 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00673 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00674 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00675 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00676 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00677 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00678 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00679 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00680 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4.05            |                           | Y                | Y                                |
| P4-00681 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00682 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00683 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00684 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00685 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00686 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00687 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00688 | 8/18/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00689 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 4               |                           | Y                | Y                                |
| P4-00690 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 2               |                           | Y                |                                  |
| P4-00691 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 1               |                           | Y                |                                  |
| P4-00692 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 4               |                           | Y                | Y                                |
| P4-00693 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 2               |                           | Y                |                                  |
| P4-00694 | 8/19/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 1               |                           | Y                |                                  |
| P4-00695 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00696 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00697 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00698 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00699 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00700 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00701 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00702 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00703 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00704 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00705 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00706 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00708 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00709 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00710 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00711 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00712 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00713 | 8/19/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00714 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 4               |                           | Y                | Y                                |
| P4-00715 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 2               |                           | Y                |                                  |
| P4-00716 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 1               |                           | Y                |                                  |
| P4-00717 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 4               |                           | Y                | Y                                |
| P4-00718 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 2               |                           | Y                |                                  |
| P4-00719 | 8/20/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 1               |                           | Y                |                                  |
| P4-00720 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00721 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00722 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00723 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 3.95            |                           | Y                | Y                                |
| P4-00724 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00725 | 8/20/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00726 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00727 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00728 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00729 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            |                           | Y                | Y                                |
| P4-00730 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 2.05            |                           | Y                |                                  |
| P4-00731 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00732 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00733 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |

Table 2. Phase 4A ABS Sample Summary

| SampleID | Sample Date | Location | Scenario                                  | Individual | Flow Rate (lpm) | Direct Prep Complete(Y/N) | Overloaded (Y/N) | Selected for Indirect Prep (Y/N) |
|----------|-------------|----------|-------------------------------------------|------------|-----------------|---------------------------|------------------|----------------------------------|
| P4-00734 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00735 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            |                           | Y                |                                  |
| P4-00736 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00737 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 1               | Y                         |                  |                                  |
| P4-00739 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                | Y                                |
| P4-00740 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00741 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00742 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            |                           | Y                | Y                                |
| P4-00743 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00744 | 8/24/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00745 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 3.95            |                           | Y                | Y                                |
| P4-00746 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 2               |                           | Y                |                                  |
| P4-00747 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 1               |                           | Y                |                                  |
| P4-00748 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 3.95            |                           | Y                |                                  |
| P4-00749 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 2               |                           | Y                |                                  |
| P4-00750 | 8/25/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 1               | Y                         |                  |                                  |
| P4-00751 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 4.05            |                           | Y                | Y                                |
| P4-00752 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00753 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 1          | 1               |                           | Y                |                                  |
| P4-00754 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 4.05            |                           | Y                | Y                                |
| P4-00755 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 2.05            |                           | Y                |                                  |
| P4-00756 | 8/25/10     | ABS-07   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00757 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00758 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00759 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00760 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00761 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00762 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00763 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00764 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00765 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00766 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00767 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00768 | 8/25/10     | ABS-10   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |
| P4-00769 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 4               |                           | Y                | Y                                |
| P4-00770 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 2               |                           | Y                |                                  |
| P4-00771 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 1          | 1               |                           | Y                |                                  |
| P4-00772 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 4               |                           | Y                |                                  |
| P4-00773 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 2               |                           | Y                |                                  |
| P4-00774 | 8/26/10     | RAINY    | 1 Recreational visitor hiking             | 2          | 1               | Y                         |                  |                                  |
| P4-00775 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00776 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00777 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00778 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                |                                  |
| P4-00779 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00780 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 1               | Y                         |                  |                                  |
| P4-00781 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 4               |                           | Y                |                                  |
| P4-00782 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 2               |                           | Y                |                                  |
| P4-00783 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 1          | 1               | Y                         |                  |                                  |
| P4-00784 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 4               |                           | Y                | Y                                |
| P4-00785 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 2               |                           | Y                |                                  |
| P4-00786 | 8/26/10     | ABS-02   | 3e Cutting firelines with heavy equipment | 2          | 1               |                           | Y                |                                  |



# **ATTACHMENT 1**

**EPA-LIBBY-08**

Libby Standard Operating Procedure  
Indirect Preparation of Air and Dust Samples for TEM Analysis  
*Approved for Use at the Libby Superfund Site Only*

Date: 1/23/07

SOP No. EPA-LIBBY-08

Title: INDIRECT PREPARATION OF AIR AND DUST SAMPLES FOR TEM ANALYSIS

Author: Ron Mahoney, Ed Cahill

EMSL Analytical, Inc.

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SYNOPSIS: A standardized method is presented for indirect preparation of air and dust samples for analysis by TEM.

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Received by QA Unit:

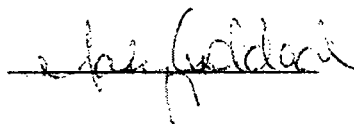
APPROVALS:

TEAM MEMBER

SIGNATURE/TITLE

DATE

EPA Region 8



1/23/07

REVISION LOG

| Revision | Date     | Reason                                                                             |
|----------|----------|------------------------------------------------------------------------------------|
| 0        | 11/28/06 | --                                                                                 |
| 1        | 1/23/07  | Clarification of filter configuration, secondary and tertiary dilution procedures. |
|          |          |                                                                                    |

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## 1.0 PURPOSE

Some air samples collected at the Libby Superfund site are overloaded with debris and/or have obvious non-uniform loading, so analysis for asbestos by Transmission Electron Microscopy (TEM) requires an indirect preparation of the sample. All dust samples collected at the Libby Superfund site are prepared for TEM analysis using an indirect preparation. The purpose of this SOP is to provide a standardized procedure for the indirect preparation of air and dust samples that minimizes the loss of sensitivity. In addition, this SOP allows for the retention of a portion of the original air sample filter for archive whenever possible.

## 2.0 RESPONSIBILITIES

The Laboratory Director is responsible for ensuring that all laboratories participating in the analysis of air samples at the Libby site are aware of this SOP and that all analysts follow this SOP. Laboratory managers and analysts are responsible for communicating to the Libby laboratory coordinator (CDM), Volpe Center and appropriate USEPA Region 8 Remedial Project Manager or Regional Chemist any recommended changes or proposed improvements to the SOP.

## 3.0 EQUIPMENT

Equipment needed to perform indirect preparations of air samples includes the following:

- Transmission electron microscope (NVLAP compliant)
- Energy dispersive X-ray system (NVLAP compliant)
- High vacuum carbon evaporator with rotating stage
- HEPA hood (NVLAP compliant)
- Exhaust or fume hood
- Particle-free water
- Glass container for ashing
- Disposable single use containers of at least 100 ml capacity
- Waterproof marker
- Forceps
- Ultrasonic bath
- Appropriate disposable glass or variable pipets with disposable tips
- Disposable 25 mm filter funnels
- Side arm filter flask
- Cellulose support pad, 25 mm diameter
- MCE filters, 25 mm diameter,  $\leq 0.22 \mu\text{m}$  and  $5.0 \mu\text{m}$  pore size
- Storage container for 25 mm filter
- Glass slides, approximately 25 x 76 mm in size
- Scalpel blades, # 10 or equivalent and handle
- Desiccator or low temperature drying oven
- Acetone, reagent grade
- Glacial acetic acid

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- Plasma asher, low temperature
- pH paper
- Tygon tubing, or equivalent
- Small vacuum pump for filtration
- Glass petri dishes
- Jaffe washer
- Carbon evaporator rods
- Wash bottles, plastic
- Reagent alcohol

#### **4.0 METHOD SUMMARY**

Figure 1 presents a simplified overview of the TEM indirect preparation procedure for overloaded air samples and dust samples. As seen, there are two general indirect preparation procedures, one that includes ashing of the primary filter and one that does not include ashing of the primary filter.

Laboratory modification LB-000053 provides a list of which sample prefix codes shall be prepared using an ashing procedure and which should not be prepared using an ashing procedure. In cases where there is a conflict regarding sample type between the sample prefix as defined by the most recent version of LB-000053 and the chain of custody instructions, the chain of custody instructions take precedent. Additionally, once sample preparations have begun, there may be cases where the analyst determines that ashing is necessary to obtain acceptable filter loading. Samples for which ashing may be warranted include indoor air or dust samples collected from properties with elevated levels of organic particulates (e.g., due to cigarette smoke or use of a wood-burning stove). In these samples, ashing may further reduce particulate loading, thus allowing for an improved analytical sensitivity.

The sections below present the detailed steps associated with each procedure. For all indirect preparations, specimen preparation should be performed in a clean facility that is separate from both bulk and air preparation areas and preparation shall take place in a negative flow HEPA hood to prevent any possible contamination of the laboratory or personnel.

#### **4.1 PROCEDURE 1: Indirect Preparation with Ashing**

This procedure should be followed for air and dust samples where LB-000053 or the chain of custody form indicates that ashing should be performed. For the purpose of the Libby Superfund Site, air samples are defined as overloaded if there is >25% obscuration on the majority of the grid openings.

If there is no loose material present in the air cassette or adhering to the cowl, this procedure is generally similar to the indirect preparation method specified in ISO 13794, but has been modified to increase the total solution volume from 40 ml to 100 ml and to retain a portion of the original filter. The use of a 100 ml final volume is selected because it allows for preparation of a

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series of indirect samples with volumes that are sufficiently large that secondary dilution is not needed to ensure uniform deposition on the filter.

If there is loose material present in the air cassette or adhering to the cowl, or if the sample is a dust sample, a portion of the original filter is not retained for archive, since it is assumed that there will be uneven loading on the filter. Because of this, an archived portion of the original filter is unlikely to be representative. In this case, the indirect preparation procedure is similar to the method specified in ASTM D-5755, but has been modified to include an ashing of the primary filter.

- 4.1.1 Carefully wet-wipe the exterior of the cassettes to remove any possible contamination prior to taking the cassettes into the clean preparation area.
- 4.1.2 Within a safety hood, carefully open the cassette and verify if there is any loose material in the cassette or adhering to the cowl. **If this is an air sample and there is no visible loose material present, proceed to Step 4.1.6.**
- 4.1.3 Any loose material that is present in the cassette should be poured into a disposable 50 ml glass beaker or similar container.
- 4.1.4 Using freshly cleaned forceps, remove the sample collection filter from the sampling cassette and place it in the same disposable 50 ml glass beaker or similar container with the side containing the sample facing down.
- 4.1.5 Using a 50/50 alcohol/particle-free water solution, rinse any material adhering to the cowl into a new 25 mm diameter disposable filtration funnels. If the filtration unit does not come pre-assembled with the necessary components (e.g. contains a glass fiber filter instead of the required MCE filter), it will be necessary to disassemble the stock cassette as it comes from Whatman and discard the glass-fiber filter. Rinse the filter unit thoroughly with particle free water and reassemble the filter unit using a cellulose support pad (Pall 66238), a 5.0µm pore size MCE diffuser filter (Enviro-pore FILA500A025A), and a 0.2 µm pore size MCE final filter (Enviro-pore FILA020A025A). Apply vacuum. When all solution has passed through, rinse sides of filter funnel with a stream of particle free water to dislodge any particulate that might be adhering to the sides of the filter funnel. Once filtration is complete turn off vacuum, remove filter from unit and dry. Once the filter is dry, place it in the container with the original filter and **proceed to Step 4.1.8.**
- 4.1.6 Using freshly cleaned forceps, remove the sample collection filter from the sampling cassette and place it on a clean glass microscope slide that will be used as a cutting surface. Using a freshly cleaned curved scalpel blade, cut off ½ of the filter (estimate the ½ as precisely as possible as this affects the final concentration) with a rocking motion.
- 4.1.7 Place the remaining portion of the original filter in archive. (Note: In cases where an initial direct preparation of an air sample was attempted and found to be overloaded, this archive portion will be approximately ¼ of the original filter.) Place ½ of the primary filter

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in a clean, single use disposable glass container with the side containing the sample facing down.

- 4.1.8 Cover the container with aluminum foil, forming a tight seal around the mouth.
- 4.1.9 Perforate the foil in 15-20 places with a syringe needle to allow for gas exchange during plasma ashing.
- 4.1.10 Place the sample container in the plasma asher chamber. Depending on the size of the plasma asher chamber, several samples may be ashed simultaneously.
- 4.1.11 Operate the plasma asher using the minimum power at which a glow-discharge is observed, until the filter appears to be completely ashed. Loss of particulate and fibers from the container will occur if the plasma asher is operated at excessive radio-frequency power. During ashing of mixed cellulose ester (MCE) filters, a critical point is reached during the oxidation at which a sudden, violent ignition may occur if the radio-frequency power is excessive. This may result in a loss of fibers from the container, contamination of the interior of the chamber, and possible cross-contamination of the samples. For this reason, ashing of the blank should be observed closely during the early stages of oxidation, in order to ensure that the radio-frequency power setting is such that sudden ignition does not occur.
- 4.1.12 After 100% ashing is complete based on visual observation, increase the plasma asher power to maximum and ash for a period of one additional hour.
- 4.1.13  
While final ashing is in progress, set up the filtration system to be used. In order to minimize the chances of contamination, only 25 mm diameter disposable filtration funnels shall be used. If the filtration unit does not come pre-assembled with the necessary components (e.g. contains a glass fiber filter instead of the required MCE filter), it will be necessary to disassemble the stock cassette as it comes from Whatman and discard the glass-fiber filter. Rinse the filter unit thoroughly with particle free water and reassemble the filter unit using a cellulose support pad (Pall 66238), a 5.0 $\mu$ m pore size MCE diffuser filter (Enviro-pore FILA500A025A), and a 0.2  $\mu$ m pore size MCE final filter (Enviro-pore FILA020A025A). Filter as usual, using restraint with the amount of vacuum applied to avoid uneven loading. Add 20 ml of particle-free water to the filtration apparatus prior to applying vacuum and introduction of the sample suspension. When seating the filters in the filtration unit, it is essential that the vacuum be evenly applied to help ensure an even distribution of particulate on the filter. There should be no air bubbles or surface abnormalities anywhere in the filter assemblage. This is accomplished through wetting each successive filter as it is placed in the filtration unit and applying a light vacuum. This will ensure that the filters are flat and that there are no air bubbles.
- 4.1.14 After ashing is complete, admit air slowly to the chamber and remove the samples from the plasma asher chamber and place back into a safety hood.



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- 4.1.15 Remove the aluminum foil from the top of the sample container.
- 4.1.16 Using particle free water in a squirt bottle, carefully rinse the ashed residue from the ashing container into a clean disposable sample container of at least 100 ml with a watertight lid, such as a sealed specimen cup. Rinse the residue into the 100 ml container to an initial volume of approximately 90 ml. Adjust pH to approximately 3-4 using a 10% solution of glacial acetic acid, and checking with pH paper. Bring the final volume to 100 ml and cap tightly.
- 4.1.17 Briefly hand shake (3 seconds) the capped container containing the sample suspension.
- 4.1.18 Place the container in a calibrated tabletop ultrasonic bath and sonicate at 50 - 100 nW/ml for three minutes. The liquid level in the bath should be  $\frac{1}{2}$  to  $\frac{3}{4}$  the height of the sample containers. Wipe the outside of the sample containers dry when removing them from the bath.
- 4.1.19 After sonication, lightly hand shake the suspension for 3 seconds, and allow it to stand undisturbed for 2 minutes to allow large particles to settle to the bottom or float to the top.
- 4.1.20 For each sample, prepare three secondary filters by applying volumes of 50 ml, 25 ml, and 10 ml. For air samples where the direct preparation proves to be overloaded, it is acceptable to filter aliquot volumes other than the usual 10 ml, 25 ml, and 50 ml series, either a greater or lesser volume, in order to produce a sample with the highest possible f-factor without violating the overload criteria. Draw each aliquot to be filtered with the same pipette and dispense into the appropriate filter funnel. Avoid pipetting any large settled or floating particles. Apply vacuum to the filtration apparatus to draw each volume through the filter. For samples where the 10 ml aliquot filter is obviously overloaded and a secondary dilution will be required (see 4.1.21), it is not necessary to attempt to filter the 25 ml and 50 ml aliquots through 25 mm filter units.
- 4.1.21 If a preliminary observation of the 10 ml secondary filter appears overloaded take 10 ml of the remaining volume and dilute to 100 ml. From this secondary dilution, prepare a second series of filters using 50 ml, 25 ml, and 10 ml (corresponding to 5 ml, 2.5 ml, and 1 ml of the original suspension). Based on the original 10 ml aliquot filter loading, it is acceptable to filter aliquot volumes other than the usual 10 ml, 25 ml, and 50 ml series in order to produce a sample with the highest possible f-factor without violating the overload criteria. In some instances, it may be necessary to perform a tertiary serial dilution, taking 10 ml of the secondary dilution, adding it to 90 ml of particle free water, and filtering another series of aliquots of 10 ml, 25 ml, and 50 ml.
- 4.1.22 Disassemble the filtration units. Carefully remove the filters from the filtration apparatus using fine forceps, being careful to only touch the inactive rim of the filter that has not been exposed to the sample. Place each filter in a labeled petri dish or other similar container, active side up and dry.

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- 4.1.23 Select the secondary filter from the dilution series yielding the largest possible f-factor (highest possible volume) which does not violate the criteria for an overloaded sample. Experience has shown that a light staining of the filter will yield a suitable preparation for analysis.
- 4.1.24 Perform a standard TEM sample preparation procedure.
- 4.1.25 If TEM examination of the lowest volume aliquot filtered is deemed overloaded (>25% particulate), consult with the Libby laboratory coordinator (CDM) to select the most appropriate next step.
- 4.1.26 Carefully label and place each of the unused secondary filters and the remaining portion of the selected secondary filter in archive.
- 4.1.27 Place any remaining sample solution in a graduated cylinder or pipet. The largest known quantity of the remaining solution should be filtered through a 25 mm disposable filtration unit with a  $\leq 0.22 \mu\text{m}/5.0 \mu\text{m}$  pore size MCE filter set in conjunction with a cellulose support pad and dried after removal from the filtration unit. A larger diameter (e.g. 47 mm) filtration unit with the same filter configuration may be used as needed to avoid situations where a 25 mm diameter filter may become obstructed with material. The dried filter shall be placed in an appropriate container, and labeled with the sample number, filter type, and volume applied to the filter. This filter will then be archived with the other archived filters from the sample.
- 4.1.28 Discard the remaining portion of the sample solution using standard laboratory protocols.

## **4.2 PROCEDURE 2: Indirect Preparation without Ashing**

This procedure should be followed for air and dust samples where LB-000053 or the chain of custody form indicates that ashing should not be performed. For the purpose of the Libby Superfund Site, samples are defined as overloaded if there is >25% obscuration on the majority of the grid openings.

If there is no loose material present in the air cassette or adhering to the cowl, this procedure is generally similar to the indirect preparation method specified in ASTM D-5755, but has been modified to allow for an archive of the original filter.

If there is loose material present in the air cassette or adhering to the cowl, or if the sample is a dust sample, a portion of the original filter is not retained for archive, since it is assumed that there will be uneven loading on the filter. Because of this, an archived portion of the original filter is unlikely to be representative. In this case, the indirect preparation procedure is equivalent to the method specified in ASTM D-5755.

- 4.2.1 Carefully wet-wipe the exterior of the cassettes to remove any possible contamination prior to taking the cassettes into the clean preparation area.

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- 4.2.2 Carefully open the cassette and verify if there is any loose material in the cassette or adhering to the cowl. **If this is an air sample and there is no visible loose material present, proceed to Step 4.2.5.**
- 4.2.3 Using a 50/50 alcohol/particle-free water solution, rinse any material adhering to the cowl down onto the sample collection filter (still inside the sampling cassette).
- 4.2.4 Using freshly cleaned forceps, remove the sample collection filter from the sampling cassette and place it into a clean disposable sample container of at least 100 ml with a watertight lid, such as a sealed specimen cup. **Proceed to Step 4.2.7.**
- 4.2.5 Using freshly cleaned forceps, remove the sample collection filter from the sampling cassette and place it on a clean glass microscope slide that will be used as a cutting surface. Using a freshly cleaned curved scalpel blade, cut off  $\frac{1}{2}$  of the filter (estimate the  $\frac{1}{2}$  as precisely as possible as this affects the final concentration) with a rocking motion.
- 4.2.6 Place the remaining portion of the original filter in archive. (Note: In cases where an initial direct preparation of an air sample was attempted and found to be overloaded, this archive portion will be approximately  $\frac{1}{4}$  of the original filter.) Place  $\frac{1}{2}$  of the primary filter in a clean disposable sample container of at least 100 ml with a watertight lid, such as a sealed specimen cup.
- 4.2.7 Bring the total volume of the suspension up to approximately 90 ml using particle-free water only.
- 4.2.8 Adjust the suspension to a pH of 3-4 using a 10 % solution of acetic acid. Use pH paper to test.
- 4.2.9 Bring the total volume up to 100 ml using particle-free water and cap tightly.
- 4.2.10 Set up the filtration system to be used. In order to minimize the chances of contamination, only 25 mm disposable filtration funnels (such as Whatman cat. #:1922-1820) shall be used. If the filtration unit does not come pre-assembled with the necessary components (e.g. contains a glass fiber filter instead of the required MCE filter), it will be necessary to disassemble the stock cassette as it comes from Whatman and discard the glass-fiber filter. Rinse the filter unit thoroughly with particle free water and reassemble the filter unit using a cellulose support pad (Pall 66238), a 5.0 $\mu$ m pore size MCE diffuser filter (Enviro-pore FILA500A025A), and a 0.2  $\mu$ m pore size MCE final filter (Enviro-pore FILA020A025A). Filter as usual, using restraint with the amount of vacuum applied to avoid uneven loading. Add 20 ml of particle-free water to the filtration apparatus, prior to applying vacuum and introduction of the sample suspension. When seating the filters in the filtration unit, it is essential that the vacuum be evenly applied resulting in even distribution. There should be no air bubbles or surface abnormalities anywhere in the filter assemblage. This is accomplished through wetting each successive filter as it is placed in the filtration unit and

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applying a light vacuum. This will assure that the filters are flat and that there are no air bubbles. Ensure that suspension is filtered within 24 hours to avoid problems associated with bacterial and fungal growth.

- 4.2.11 Briefly hand shake (3 seconds) the capped container containing the sample suspension.
- 4.2.12 Place the container in a calibrated tabletop ultrasonic bath and sonicate at 50 - 100 nW/ml for three minutes.
- 4.2.13 After sonication, lightly hand shake the suspension for 3 seconds, and allow it to stand undisturbed for 2 minutes to allow large particles to settle to the bottom or float to the top.
- 4.2.14 For each sample, prepare three secondary filters by drawing aliquots of 50 ml, 25 ml, and 10 ml. For air samples where the direct preparation is overloaded, it is acceptable to filter aliquot volumes other than the usual 10 ml, 25 ml, and 50 ml series (either greater or lesser volumes) in order to produce a sample with the highest possible f-factor without violating the overload criteria. Draw each aliquot to be filtered with the same pipette and dispense into the appropriate filter funnel. Avoid pipetting any large settled or floating particles. Apply vacuum to the filtration apparatus to draw each volume through the filter. For samples where the 10 ml aliquot filter is obviously overloaded and a secondary dilution will be required (see 4.2.15), it is not necessary to attempt to filter the 25 ml and 50 ml aliquots through 25 mm filter units.
- 4.2.15 If a preliminary observation of the 10 ml secondary filter appears overloaded take 10 ml of the remaining volume and dilute to 100 ml. From this secondary dilution, prepare a second series of filters using 50 ml, 25 ml, and 10 ml (corresponding to 5 ml, 2.5 ml, and 1 ml of the original suspension). Based on the original 10 ml aliquot filter loading, it is acceptable to filter aliquot volumes other than the usual 10 ml, 25 ml, and 50 ml series (either greater or lesser volumes) in order to produce a sample with the highest possible f-factor without violating the overload criteria. In some instances, it may be necessary to perform a tertiary serial dilution, taking 10 ml of the secondary dilution, adding it to 90 ml of particle free water, and filtering another series of aliquots of 10 ml, 25 ml, and 50 ml.
- 4.2.16 Disassemble the filtration unit. Carefully remove the filter from the filtration apparatus using fine forceps, being careful to only touch the inactive rim of the filter that has not been exposed to the sample. Place the filter in a labeled petri dish or other similar container, active side up and dry.
- 4.2.17 Select the secondary filter from the dilution yielding the largest possible f-factor (highest volume) which does not violate the criteria for an overloaded sample. Experience has shown that a light staining of the filter will yield a suitable preparation for analysis.
- 4.2.18 Perform a standard TEM sample preparation procedure.

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4.2.19 If TEM examination of the lowest volume aliquot filtered is deemed overloaded, consult with the Libby laboratory coordinator (CDM) to select the most appropriate next step.

4.2.20 Place each of the unused secondary filters and the remaining portion of the selected secondary filter in archive.

4.2.21 Place any remaining sample solution in a graduated cylinder or pipet and add to a prepared 25 mm filtration unit containing a  $\leq 0.22 \mu\text{m}/5.0 \mu\text{m}$  pore size filter set with a cellulose support pad in a disposable filtration unit with a small volume of particle free water to facilitate the production of a homogeneous solution and record the volume of sample solution added. A larger diameter (e.g. 47 mm) filtration unit with the same filter configuration may be used as needed to avoid situations where a 25 mm diameter filter may become obstructed with material. Add 10 ml particle free water to the sample container containing the residual filter and sonicate for three minutes. Add this solution to the filtration unit for the corresponding filtration unit for each sample as described in the first part of this paragraph. Do not include this 10 ml in the volume calculation of the sample solution added. This solution should then be filtered through the filtration unit and dried after removal from the filtration unit. The dried filter shall be placed in an appropriate container, and labeled with the sample number, filter type, and volume applied to the filter. This filter will then be archived with the other archived filters from the sample.

4.2.22 Discard the remaining portion of the sample solution using standard laboratory protocols.

## 5.0 DOCUMENTATION AND ARCHIVE STORAGE

Project-specific Index IDs are recorded on all air samples. During each indirect preparation step, this Index ID is noted on the sample-specific beakers, containers, and filtration units.

In those cases where no loose material is present in the cassette or adhering to the cowl, the remaining portion of the original primary filter is placed in a suitable container and clearly labeled with the sample number and indicated that it is the original primary filter. In those cases where secondary or tertiary filters are prepared, all filters or remnants of filters will be archived into suitable containers, and clearly labeled with the sample number and the volume of the aliquot applied to each filter.

Analysis-specific details about the indirect preparation will be recorded in the sample TEM electronic data deliverable (EDD) spreadsheet. In the TEM EDD, if the sample is prepared using Procedure 1 (see Section 4.1) the preparation method should be identified as "IA – Indirect, ashed" and the appropriate inputs should be recorded in the fields provided. If the sample is prepared using Procedure 2 (see Section 4.2), the preparation method should be identified as "I – Indirect" and the appropriate inputs should be recorded in the fields provided. The spreadsheet is designed to automatically calculate the dilution factor, or f-factor, which is used in the calculation the sample air or dust concentration.

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## **6.0 QUALITY ASSURANCE**

All quality control sample results will be monitored for potential contamination. If sample results indicate cross-contamination, the laboratory will identify the affected samples and notify the USEPA Regional Chemist and project laboratory coordinator (CDM). Laboratory procedures will be re-assessed and appropriate changes will be made and documented accordingly by the project laboratory coordinator.

### **6.1 Lot Blanks**

All cassettes utilized in the Libby project are screened for contamination by either TEM analysis or a combination of TEM and PCM analysis. One lot blank is prepared and analyzed from each carton of cassettes prior to using the lot of cassettes for sampling. The entire carton of cassettes will be rejected if any asbestos fiber is detected on the lot blank.

### **6.2 Filter blanks**

Prior to filtration of the sample aliquot, 100ml particle-free water should be filtered. Acceptance criteria for filter blanks are as specified for laboratory blanks in the latest version of laboratory modification of LB-000029.

### **6.3 Plasma asher blanks**

To ensure that contamination is not introduced during the ashing process, a container with an unused filter should be run as a blank with each batch of samples ashed. This sample will be prepared using the standard TEM sample preparation procedure and examined as per the established QC sequence. Acceptance criteria for plasma asher blanks are as specified for laboratory blanks in the latest version of laboratory modification of LB-000029.

## **7.0 DECONTAMINATION**

All non-disposable equipment used during sample preparation must be decontaminated prior to use. Because the prescribed filtration units used to prepare the secondary filters are disposable, decontamination of filtration units is not required.

## **8.0 GLOSSARY**

EDD - Electronic Data Deliverable. A Libby-specific spreadsheet designed to capture the detailed analysis and raw structure data generated during a TEM analysis. Contact the project laboratory coordinator (CDM) for the current TEM spreadsheet version.

HEPA - High Efficiency Particulate Air



Libby Standard Operating Procedure  
Indirect Preparation of Air and Dust Samples for TEM Analysis  
*Approved for Use at the Libby Superfund Site Only*

MCE - Mixed Cellulose Ester

TEM - Transmission Electron Microscopy

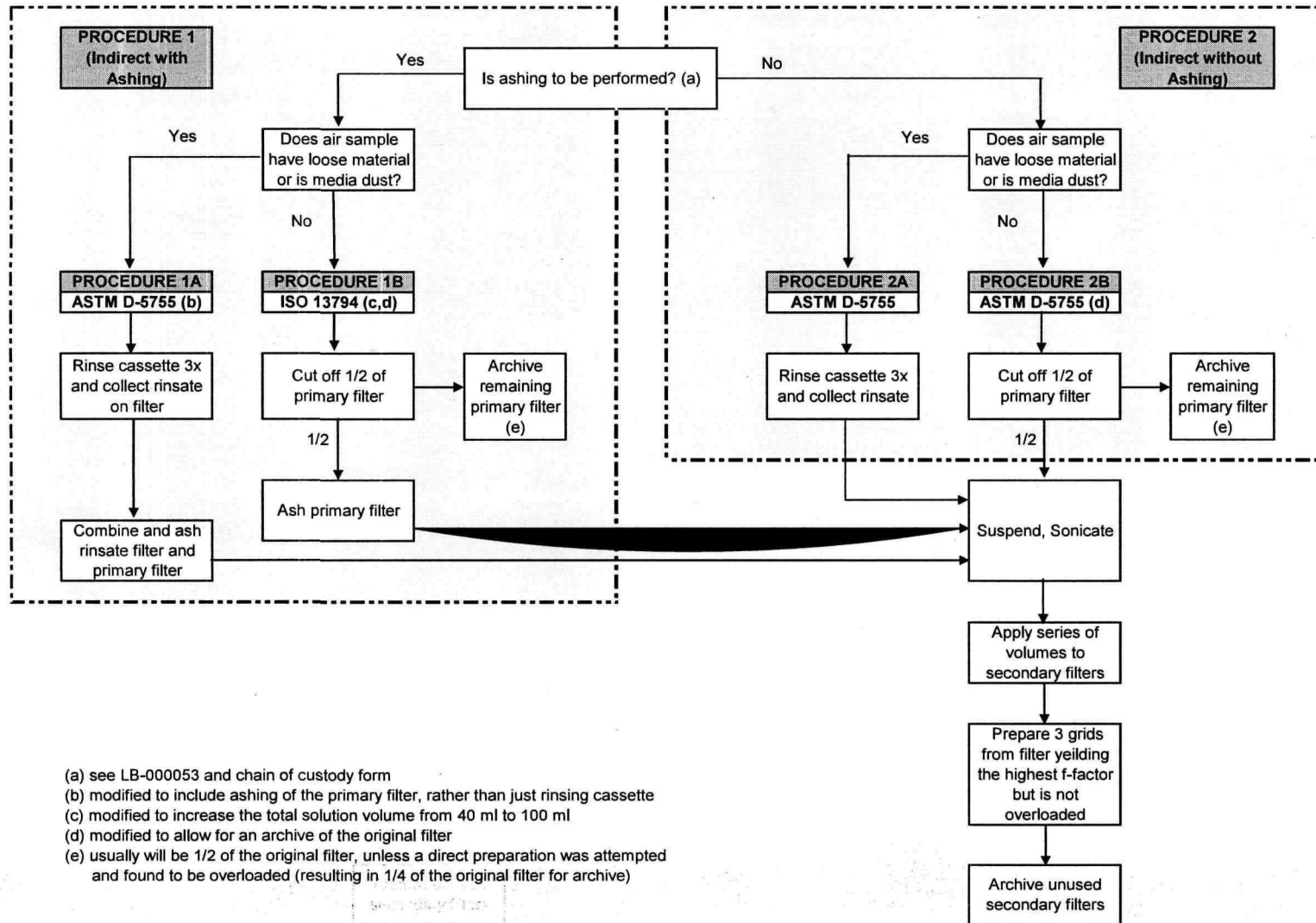
## **9.0 REFERENCES**

ISO 13794. Ambient air - Determination of asbestos fibres - Indirect-transfer transmission electron microscopy method. International Organization for Standardization (ISO) 13794:1999. November 15, 1999.

ASTM D-5755. Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading. ASTM D 5755-03. October 2003.

Libby Standard Operating Procedure  
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**FIGURE 1. INDIRECT PREPARATION OF OVERLOADED AIR SAMPLES AND DUST SAMPLES FOR TEM ANALYSIS**





**Libby OU3 - Phase IVA mod - indirect preparation**

**Bonita Lavelle to: kyeong.corbin**

09/14/2010 05:22 PM

**Cc: mobileasbestoslab, CLaCerra, Robert.R.Marriam, robert.j.medler**

Dear Kyeong,

Attached please find Field Modification 3 to the Phase IVA SAP. This modification incorporates indirect preparation procedures for samples to be analyzed by TEM and identifies the samples to which these methods apply. Note the required language to be included in laboratory reports.



OU3 Field Mod 03 signed.pdf

Please call if you have any questions or concerns.  
All field modifications can be found on the OU3 web page.

Sincerely,

Bonnie Lavelle  
Remedial Project Manager  
Libby Asbestos Superfund Site, OU3  
EPA Region 8  
1595 Wynkoop Street  
8EPR-SR  
Denver, CO 80202-1129

(303) 312-6579  
Fax (303) 312-7151



RE: Libby OU3 - Phase IVA mod - indirect preparation

Kyeong Corbin

to:

Bonita Lavelle

09/15/2010 01:45 PM

Cc:

Robert.R.Marriam

Please respond to kyeong.corbin

Show Details

Hi Bonnie,

I have read the modification and have a few comments.

First, I wanted to point out that majority of the samples we rejected for direct prep are not necessarily overloaded but rather dusty. Secondly, "unevenly loaded" condition should not be the selection criteria for the next volume samples. Unevenness is the reason why we do indirect prep in the first place. In my opinion, we should go with the highest volume filter for indirect prep unless the filter is damaged.

Thanks,  
Kyeong

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**From:** Lavelle.Bonita@epamail.epa.gov [mailto:Lavelle.Bonita@epamail.epa.gov]

**Sent:** Tuesday, September 14, 2010 4:23 PM

**To:** kyeong.corbin@atcassociates.com

**Cc:** mobileasbestoslab@emsl.com; CLaCerra@EMSL.com; Robert.R.Marriam@grace.com; robert.j.medler@grace.com

**Subject:** Libby OU3 - Phase IVA mod - indirect preparation

Dear Kyeong,

Attached please find Field Modification 3 to the Phase IVA SAP. This modification incorporates indirect preparation procedures for samples to be analyzed by TEM and identifies the samples to which these methods apply. Note the required language to be included in laboratory reports.

Please call if you have any questions or concerns.  
All field modifications can be found on the OU3 web page.

Sincerely,

Bonnie Lavelle  
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